A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

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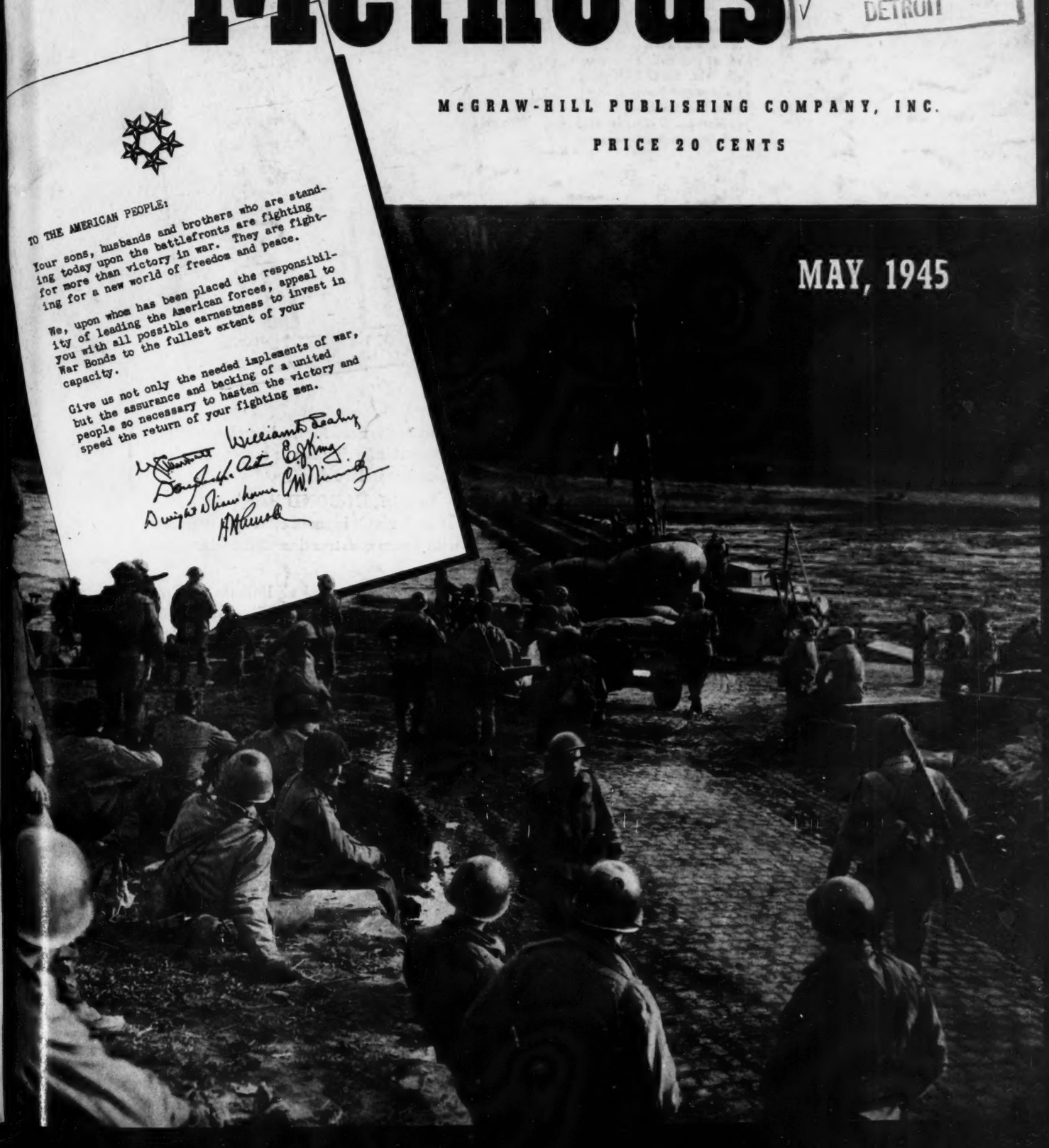
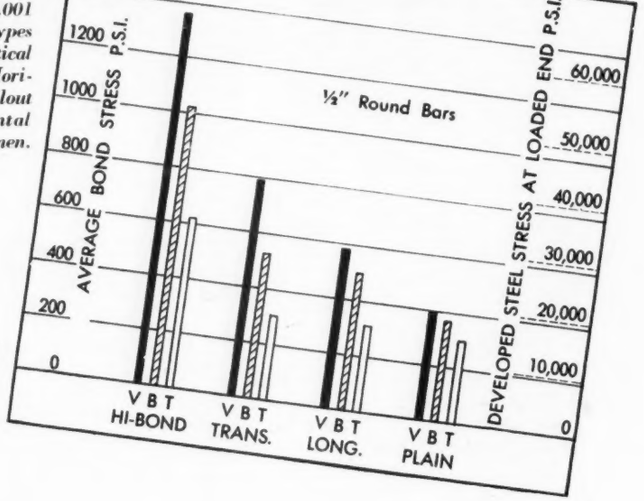

TO THE AMERICAN PEOPLE:
Your sons, husbands and brothers who are standing today upon the battlefronts are fighting for more than victory in war. They are fighting for a new world of freedom and peace.
We, upon whom has been placed the responsibility of leading the American forces, appeal to you with all possible earnestness to invest in War Bonds to the fullest extent of your capacity.
Give us not only the needed implements of war, but the assurance and backing of a united people so necessary to hasten the victory and speed the return of your fighting men.

Inland Creates
a Better Reinforcing Bar

Bond and steel stresses developed at a slip of 0.001 in. at free end. Four types of ½-in. bars. V-Vertical pullout specimen. B-Horizontal cast (bottom) pullout specimen. T-Horizontal cast (top) pullout specimen.



Results are the average of six specimens—see technical bulletin.

Backed by many years of practical experience in design and field requirements, Inland engineers have created a vastly improved reinforcing bar—known as the HI-BOND Bar.

Many tests similar to the above prove that HI-BOND Bars have far higher bond stress than any other type of bar.

This bar, of entirely new design, assures more effective mechanical grip regardless of the position in which it is cast or the direction in which it is pulled. The HI-BOND Bar decreases cracks, thereby reducing the possibility of corrosion of the steel. By more efficient transfer of stress at splices, the HI-BOND Bar reduces the need for hook anchorage. This better reinforcing bar is easy to fabricate to any standard form.

In brief, HI-BOND Bars, produced by Inland, result in more efficient structures, and lower construction and maintenance costs.

Write for technical bulletin—"Engineering Tests Prove Bonding Strength of HI-BOND Reinforcing Bar."

INLAND STEEL COMPANY

38 South Dearborn Street • Chicago 3, Illinois.

Sales Offices: **Cincinnati • Detroit • Indianapolis Kansas City • Milwaukee • New York • St. Louis • St. Paul**

INLAND HI-BOND
CONCRETE REINFORCING BARS

CURRENT JOBS

. . . and Who's Doing Them

BUILDINGS

Public—Army contract for hospital in Honolulu was awarded to **York & Sawyer,** of New York, N. Y., for $16,000,000. Navy contract for $7,300,430 ordnance plant addition at McAlester, Okla., went to **J. A. Terteling,** of Boise, Idaho. **Bechtel-McCone Co.,** of Los Angeles, will build $6,500,000 toluene plant at Broger, Tex. **Maxon Construction Co.,** of Dayton, Ohio, has $6,291,000 Navy contract for magazines at Hastings, Neb. Hospital additions at Tomah, Wis., will be built by **Gust K. Newburg Construction Co.,** of Chicago, Ill., for $4,855,000. Army contract for warehouse in Maryland was awarded to **John McShain, Inc.,** of Philadelphia, Pa., for $4,000,000. Another Navy contract for $3,868,196 buildings at Hawthorne, Nev., went to **J. A. Terteling & Sons, Inc.,** of Los Angeles, Calif. Contract for $3,000,000 plant at Eunice, N. M., went to **United Engineers & Constructors, Inc.,** of Philadelphia, Pa. **Stone & Webster Engineering Co.,** of Boston, Mass., has $3,000,000 contract for plant at Guymon, Okla. Army contract for $1,000,000 foundry at Bettendorf, Ia., was awarded to **Fegles Construction Co.,** of Minneapolis, Minn. **T. Calvin Owen,** of Washington, D. C., will build dwellings for $2,130,758. **Frank Messer & Sons,** Inc., of Cincinnati, Ohio, has $1,700,000 contract for plant at Byesville. **Virginia Engineering Co.,** of Newport News, Va., was awarded contract for buildings at Murfreesboro, Tenn., for $1,531,000. Army contract for plant at Sheffield, Ala., was awarded to **J. A. Jones Construction Co., Inc.,** of Charlotte, N. C., for $1,524,000. Buildings at Lexington, Ky., will be constructed for $1,511,500 by **R. P. Farnsworth & Co.,** of New Orleans, La. **C. J. Maney Co., Inc.,** of Somerville, Mass., has $1,449,977 contract for hospital at Camp Edwards. Army contract for plant at Pine Bluff, Ark., went to **Ditmars-Dickmann Construction Co.,** of Muskogee, Okla., for $1,200,000. **M. T. Reed Construction Co.,** of Belzoni, Miss., has $1,000,000 contract for Army building at Flora. **Wigton Abbott Corp.,** of Plainfield, N. J., was awarded $1,000,000 contract for plant conversion at Allentown, Pa.

Industrial—Plant at Lockport, Ill., will be built by **M. W. Kellogg Co.,** of New York, N. Y., for $15,000,000. **W. A. Bechtel Co.,** of San Francisco, Calif., has contract for $1,500,000 factory at Tracy. Laboratory building will be constructed at Toledo, Ohio, by **Christman Co.,** of Lansing, Mich., for $1,350,000. **Mellon Stuart Co.,** of Pittsburgh, Pa., will build plant at McKeesport for $1,000,000.

HEAVY CONSTRUCTION

Transmission line in California and Nevada will be built by **Stone & Webster,** of Redlands, Calif., for $4,500,000. Navy contract for aviation storehouses was awarded to **M. H. Golden,** of San Diego, for $3,219,475. **Gull & DeFelice,** of Brooklyn, N. Y., was awarded $2,345,000 grading contract for Idlewild Airport, New York. **James I. Barnes Construction Co.,** of Santa Monica, Calif., has $1,453,000 Navy contract for hangars at Alameda, Calif. Breakwater at Alameda, Calif., will be built for Navy by **Basalt Rock Co., Inc.,** of Napa, for $1,094,338.

HIGHWAYS

Among recent highway contract awards are the following: Alabama: $203,665 to **W. M. Ford Construction Co.,** of Lafayette. Kentucky: $238,478 to **Codell Construction Co.,** of Winchester; and $219,644 to **Kentucky Road Oiling Co.,** of Frankfort. Maryland: $274,448 to **P. Flanigan & Sons,** of Baltimore. Pennsylvania: $573,339 to **C. F. Goeringer Construction Co.,** of Wilkes-Barre. Virginia: $519,517 to **Lane Construction Corp.,** of Meriden, Conn. Washington: $202,790 to **Strong & Macdonald,** of Tacoma.

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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N. A. Bowers (San Francisco) Nelle Fitzgerald
Patricia McGerr

MAY, 1945

THE *How* OF IT

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

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How **DANGEROUS INTERFERENCES** between equipment and men can be eliminated by redesign of job methods —p. 65

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How **INDIA-BURMA-CHINA PIPELINE** was built by U. S. Army Engineers to carry petroleum products —p. 68

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How **SUPERSTRUCTURE OF STEEL CARGO SHIP** was completed and propulsion system installed. —p. 84

How **APPRENTICE TRAINING PROGRAMS** are carried on by construction industry —p. 88

How **CONCRETE WAREHOUSES** were built to store Signal Corps materiel —p. 92

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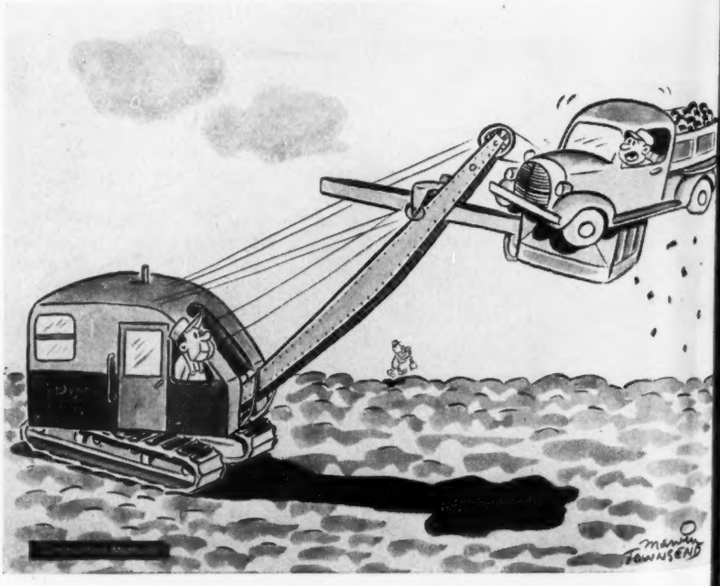
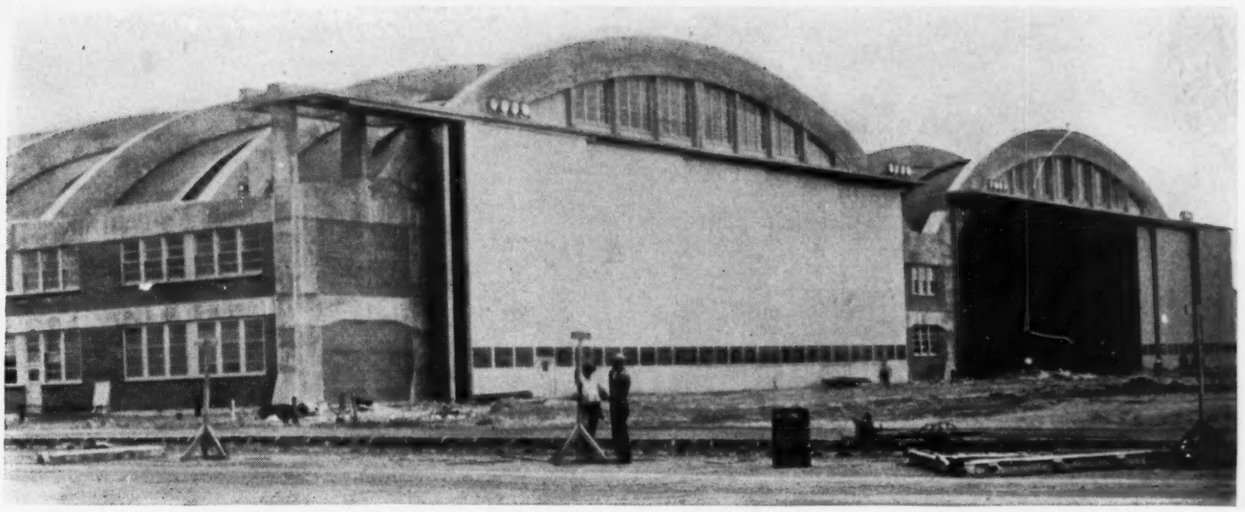
THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

"No ketchum blueprint."

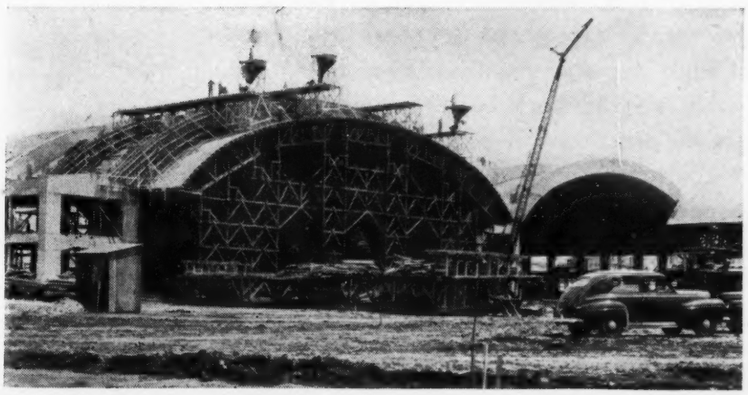


"All right, you win. Shovel operators are as good as truck drivers!"



WAR-BUILT STRUCTURES

POINT PEACE-TIME PROGRESS



SIX double seaplane hangars at an East Coast Naval Station show concrete's adaptability to design of the future. Note 160-ft. clear spans and unobstructed floor space.

Shell utilized Z-D system of Roberts & Schaefer Co., designing engineers, who arranged expansion and construction joints so the job could be formed in sections. Forms cost money, so Corbetta Construction Co., Contractors, scheduled concreting to take full advantage of dependable 'Incor' high early strength. Result—*maximum* form re-use, *minimum* form requirements.

Remember, only forms holding *wet* concrete are paying their way. So, use 'Incor' for superstructure concrete and wherever dependable 24-hour service strength means quicker form re-use and reduced form costs.

Plan new structures and reconversions with 'Incor'* 24-Hour Cement—get *earlier use at less cost.* Write for "Cutting Concrete Costs" book. *Reg. U. S. Pat. Off.

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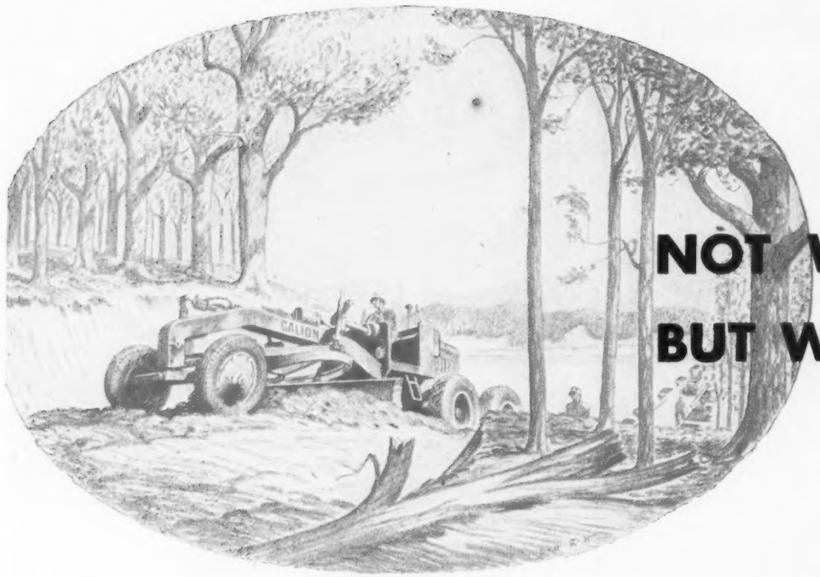
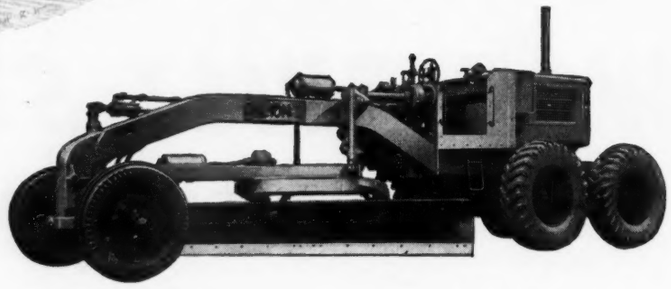
LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 25-MILLION BARRELS ANNUAL CAPACITY



NOT WHAT WE DID
BUT WHAT THEY DID

GRADERS which took extremely good care of many construction projects connected with the military engineers and the Seabees. Big, strong and dependable machines—always with the troops and ready to go when needed. Their ability to speed operations in road and airport construction has made history in this war.



MORE IMPORTANT to talk about what our equipment has been doing to help the boys on the fighting fronts than what we did back here to build that equipment. Galion rollers and graders were in on practically every big push delivering stamina and resourcefulness with as much courage and stay-put qualities as the boys themselves. Galion equipment helped speed up many a big drive toward Victory. We are proud of its part in this war.

ROLLERS by Galion is just another way of saying "That airfield was ready for our planes in record time." Precise compaction of many airfields "over there" was provided by Galion Rollers—tandem (left) and 3-wheel. Some day the part Galion rollers played in the present war will make interesting reading.

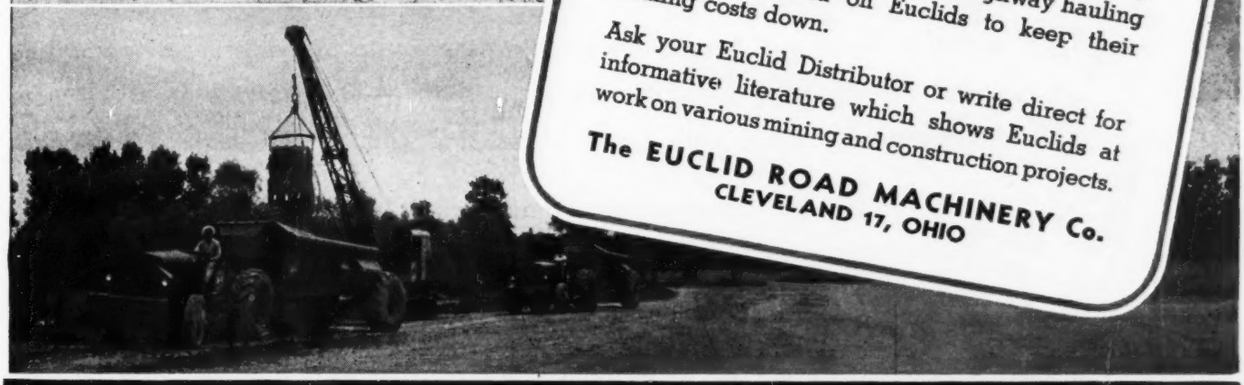
There is an authorized Galion Distributor near you—become acquainted with him—ask him to give you an introduction to those big rollers and graders—important members of the armed forces.

THE GALION IRON WORKS & MFG. CO.

Main Office and Works: GALION, OHIO

RUGGED Simplicity

For Greater Efficiency
On All Lengths of Haul



Rear-Dump and Bottom-Dump EUCLIDS have earned their reputation for dependable and efficient off-the-highway hauling on hundreds of the toughest jobs. In mines, quarries, heavy construction, and industrial applications too, the rugged simplicity of Euclids has resulted in lower hauling costs.

Built to withstand the pounding of heavy excavation and ore loaded by large shovels and draglines, Euclids combine minimum weight with maximum power and speed. Fast loading with modern digging equipment . . . speed in dumping and on the haul road . . . rugged simplicity that means efficient and dependable performance longer . . . these are reasons why more and more users of off-the-highway hauling equipment depend on Euclids to keep their hauling costs down.

Ask your Euclid Distributor or write direct for informative literature which shows Euclids at work on various mining and construction projects.

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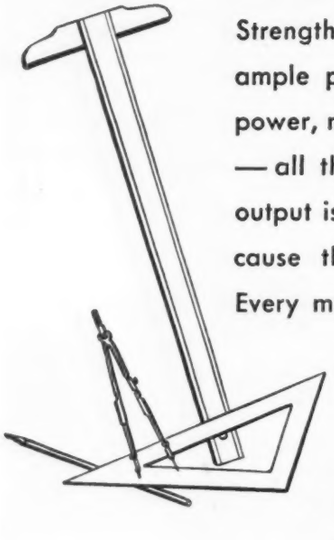
CLEVELAND 17, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT
For EARTH ROCK COAL ORE

EUCLID THE PIONEER

Individual DESIGN MEANS GREATER OUTPUT



Strength without excessive weight, ample power without wasted horsepower, maximum speed, top efficiency — all that adds up to profit-making output is yours with Bucyrus-Eries because they're right for their work. Every model is individually designed, with just the right combination of power, strength, and weight to do the job of handling its dipper load. That means low maintenance, too, because there's no overstressing of gears and shafts — none of the excessive wear that comes with makeshift models.

1E45

Individual design of each model is just one of many reasons why Bucyrus-Erie excavators are setting outstanding records in the battle regions, why they are always tops in output. The full Bucyrus-Erie performance story will convince you.

SO. MILWAUKEE **BUCYRUS ERIE** WISCONSIN

The tire with the shockproof vest

A typical example of B. F. Goodrich development in rubber

THESE giant logs shown here may give you an idea on how to get more for your tire money.

They are being hauled on some unusual tires specially built to withstand the severe impacts and shocks you get in off-the-road service. They are B. F. Goodrich Universals.

The reason Universals stand up so well is that B. F. Goodrich engineers developed a special tire construction — the Shock-Shield — that gives far greater bruise-resistance and extra protection against ply separation and blow-outs.

The Shock-Shield is a set of *four* breakers—layers of rubber-coated rayon cords—between the tread and the plies. These breakers are in *pairs,* with the cords in each pair running parallel to each other—but with each pair running in opposite directions to give balanced strength. The breakers are cushioned with thick layers of special shock-resistant rubber.

Under impact, the cords in the breakers stretch together, *not* across each other, and return to their original position. The blow is *distributed* and *absorbed* by the rubber cushions; the shock passed on to the cord body is greatly reduced.

The Universal has many other advantages; two-way traction, special tough tread compounds, tread design that prevents side slippage—and other features that help it give exceptional service on all off-the-road jobs. Supplies are strictly limited, so place tentative orders early with the B. F. Goodrich dealer, or write us direct. *The B.F.Goodrich Company, Akron, Ohio.*

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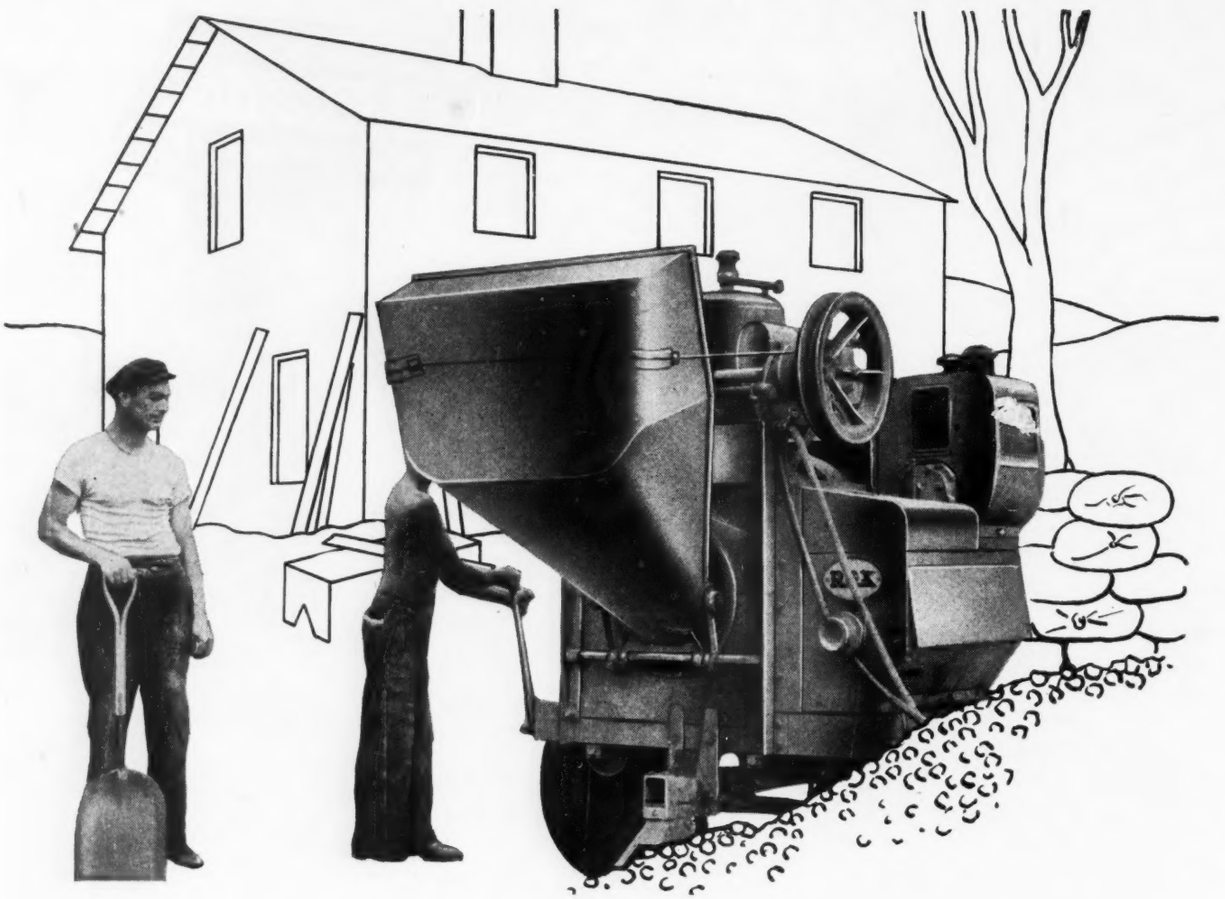
Truck & Bus Tires



WHY SCUTTLE THE SKIP?

YOU DON'T have to pound the life out of a skip to get all the batch into the drum. There's a newer and better way . . . with a Rex Mixer!

For with Rex there is no need to pound, slam or bang the skip. It's the fastest and best skip ever made . . . the "Shimmy Skip" . . . that provides the proper, snappy shaking action that kicks the batch into the drum *fast.* This shaker action is actuated by the lugs in the drum . . . the heaviest part of the machine. What's more, vibration does not reach the power plant or transmission to shorten mixer life. The streamlined design of the skip prevents "pocketing" of the batch. It's a real "time-saver," this "Shimmy Skip" action, that saves seconds on every batch.

But that's just one of the many features you get with Rex. Water control is practically 100% accurate. The exclusive Chain Belt Drive *cushions shocks,* prolongs mixer life. Designed and controlled for heaviest duty, Rex Mixers have less weight, perfect balance for easier transporting and spotting.

You can specify Rex and save time, labor and money. See your Rex Distributor for complete information or write direct for Bulletin No. 446. Chain Belt Company, **1664** West Bruce Street, Milwaukee 4, Wisconsin.

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Northwest Shovels, Cranes, Draglines and Pullshovels have always been repeat order machines and even in this day of priority buying, Northwest sales are largely repeat orders to customers of long standing.

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Have you read the NORTHWEST AD Today?

—and when you have a real Rock Shovel you won't have to worry about output in dirt.

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JUST AS MUCH AT HOME "IN SERVICE"

Thor

Army Engineers dig for buried German mine somewhere in France

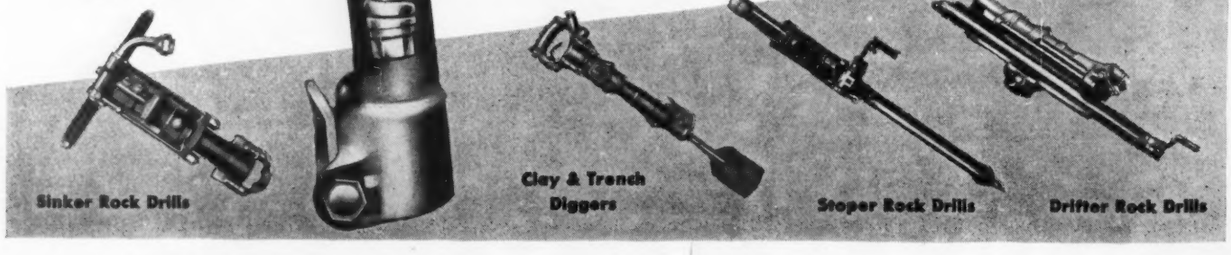
GET THE TOUGH JOBS DONE... *Faster!*

Contractors and builders swear by—not at—their Thor Paving Breakers. Construction men on the home front have found through long years of on-the-job experience that Thor equipment has the stamina and work capacity to get tough jobs done faster, better, more economically. Now, Army engineers are using the same Thor tools to do even harder and more urgent work under the most difficult conditions.

Thor Paving Breakers provide more power due to "measured air"—an exclusive Thor feature. Operators appreciate the easy handling that results from improved balance. Thor Paving Breakers are built from alloy-steel drop forgings. This assures strength, rigidity, longer life and lower operating costs. Everything you want in speed and power for breaking concrete you'll find in Thor equipment.

No. 25 PAVING BREAKER

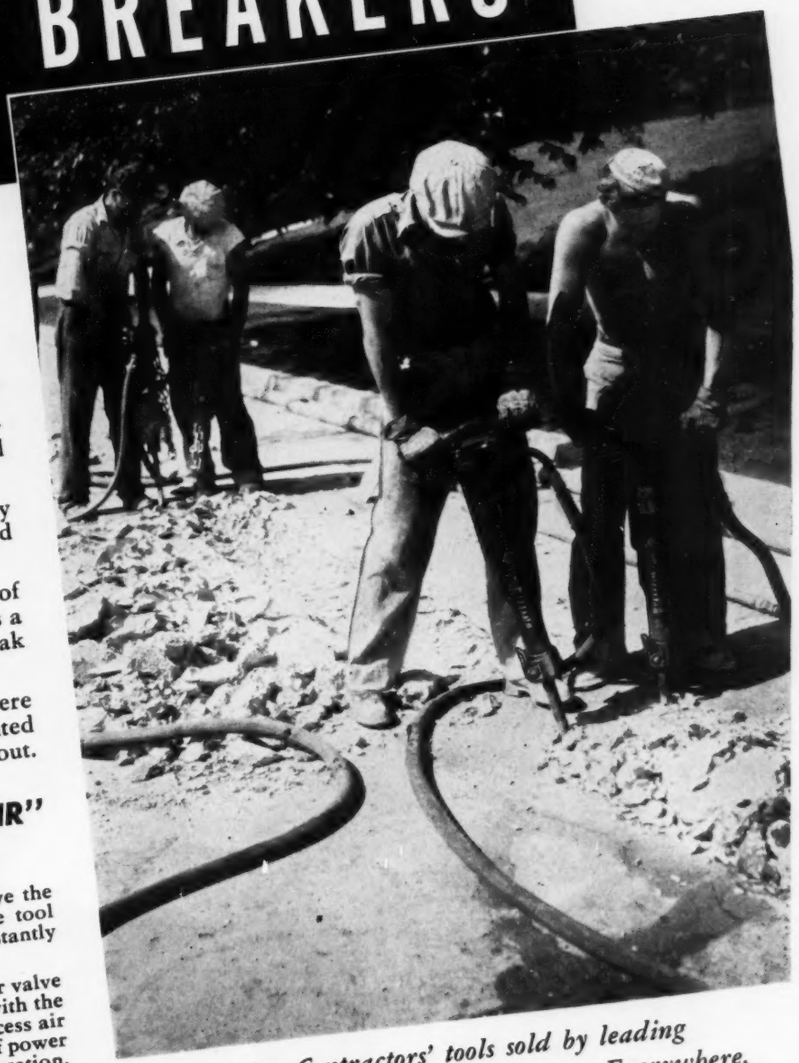
Super heavy duty—84 pound—extra powerful—for tough, rough going under all conditions—A rugged four-bolt back head, Thor positive, short-travel, tubular valve and new Thor latch type retainer all exclusive features,) are standout reasons why Thor Breakers turn out low-cost, high efficiency work so consistently.



Sinker Rock Drills | Clay & Trench Diggers | Stoper Rock Drills | Drifter Rock Drills

AS THEY ARE IN SERVICE AT HOME

PAVING BREAKERS



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1. Balanced Power—because only a precisely governed quantity of air is allowed behind the piston.

2. Smooth Performance—because every stroke is powered by the same measured quantity of air.

3. Air Economy—because every ounce of air which enters the machine provides a full measure of maximum power for peak efficiency performance.

4. Low Maintenance Cost—because there are no separate parts of the patented Thor valve to become lost or wear out.

HOW THOR "MEASURED AIR" ECONOMY WORKS . . .

The shorter the travel, the more positive the action of the valve in admitting to the tool only the required amount of air—in instantly sealing the outlet against excess air.

Short travel of the Thor Paving Breaker valve action powers each stroke of the tool with the same quantity of air. Elimination of excess air keeps out of the channel the overload of power that staggers the stroke and causes vibration.

Thor Contractors' tools sold by leading Construction Equipment Distributors Everywhere.

Sump Pumps

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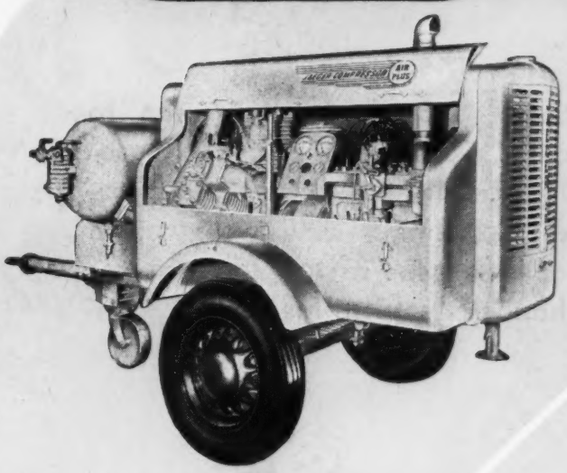

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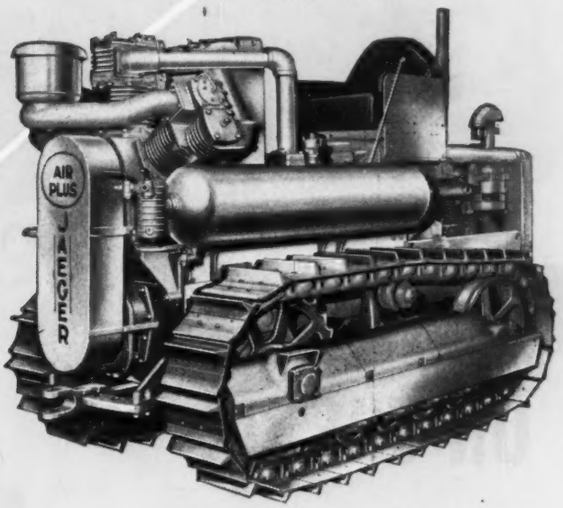

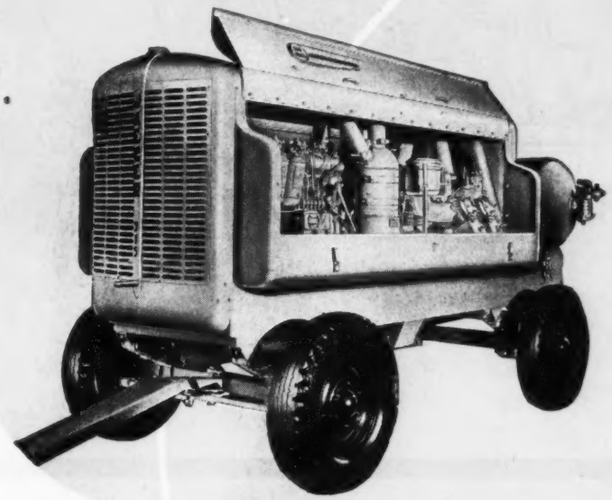

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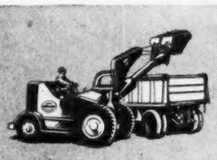
210 to 500 Ft.
Gasoline and Diesel Powered

Truck-Mounted Models 60 to 500 Ft.

Engineered for war, where rugged toughness and low fuel consumption are military "musts", these precision-built Compressors are ready to travel and deliver air for today's toughest construction jobs, at lowest known cost in fuel and upkeep. Send for complete catalog describing the most advanced line of air compressors in America. THE JAEGER MACHINE CO., 800 Dublin Ave., Columbus 16, Ohio.


"FLEET-FOOT" Loaders

"SPEEDLINE" Concrete Mixers

"SURE PRIME" Contractors Pumps

JAEGER *Engineered* EQUIPMENT

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

PUT A

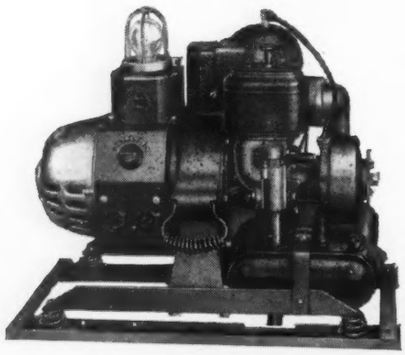
HOMELITE

ON THE JOB

AND GET IT DONE

MUCH FASTER

Small enough for one man to carry, a 2000 watt Homelite Gasoline-Engine-Driven Generator produces enough electric power to operate time-saving tools in the hands of several men. *



Capable of producing more horsepower per pound than other portable generators, a Homelite gives you longer and better service with less trouble and maintenance. Self-lubricating, air-cooled, and equipped with over-size ball bearings, the Homelite built-in two-cycle gasoline engine stands up dependably under all types of tough working conditions.

* Just one of many uses for a Homelite. Send for our new booklet showing all the time-saving uses of Homelite Portable Generators, Pumps, and Blowers.

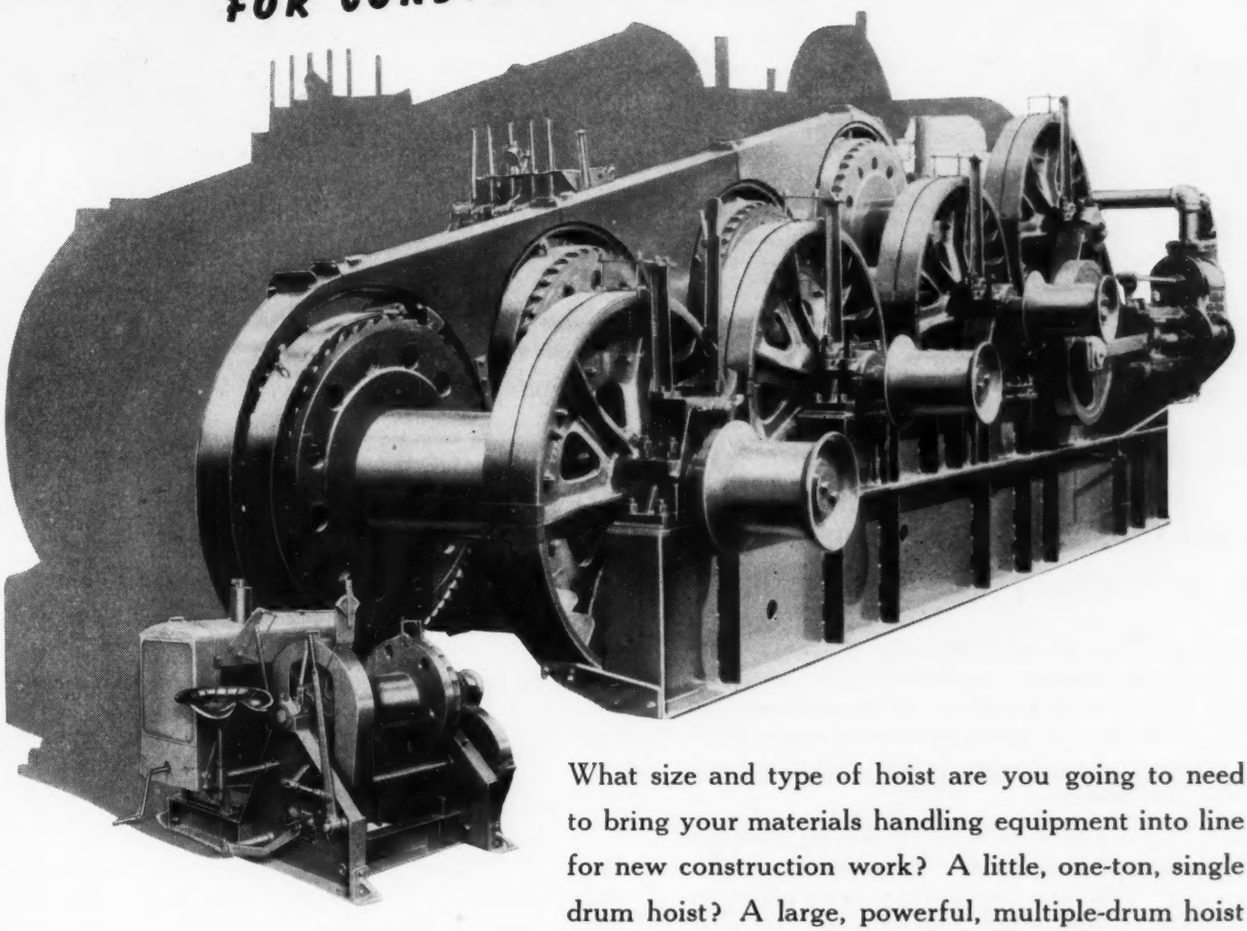
HOMELITE CORPORATION

PORT CHESTER, NEW YORK

Portable **PUMPS • GENERATORS • BLOWERS**

American HOISTS

FOR CONSTRUCTION MATERIALS HANDLING



What size and type of hoist are you going to need to bring your materials handling equipment into line for new construction work? A little, one-ton, single drum hoist? A large, powerful, multiple-drum hoist for 250-ton derrick work and larger? Or is it a hoist somewhere in between? In the AMERICAN complete line of hoists there is a proved, modern design hoist for whatever your requirements in line pull, speed, type of power, and operating convenience.

Now is the time to look into your hoist requirements.

4522

Plan now . . . but wait for **AMERICAN!**

AMERICAN **MATERIALS HANDLING** *for* **EVERY INDUSTRY**

AMERICAN HOIST & DERRICK CO.

Saint Paul 1, Minnesota

CHICAGO SAN FRANCISCO NEW YORK

Wherever wire rope is fastened . . . . use genuine **CROSBY CLIPS** *with the Red-U-Bolt*

ON 700' ONE-WAY HAUL...

TOURNAPULLS average 14 round trips per hour

Potts and Callahan's 4 Tournapulls Prove Ability to Profitably Handle Short Hauls

On relocation of Pennsylvania state highway 22, near Harrisburg, Potts and Callahan Contracting Co., Inc., long-time LeTourneau owner, used 4 Super C Tournapulls on 700' one-way hauls. Working in shale, each fast-moving, rubber-tired rig averaged a complete cycle of load, haul, spread and return every 3.55 minutes.

Loads were obtained in as little as 45 seconds, with the aid of a pusher or snatch tractor. Tournapull speed cut spreading time. This, plus fast accceleration to 14.9 mph travel and quick turns gave high average speed to complete trips fast . . . enabled each Tournapull to average 14 round trips hourly on the 700-foot haul.

What's more, big rubber-tired Tournapulls extend Carryall Scraper earthmoving economies on all hauls, work over concrete without surface damage . . . enable you to handle a wide variety of jobs.

TIME STUDY

Length of Haul	700' one way
Material	shale with small % of clay
Round trips per 50-min. hour	14
Average load . . .	8.0 pay yards, due to 40% voids in loaded shale.
Hourly output per unit	112 pay yards.

Try Tournapulls on Your Jobs

On scores of other roadwork, airport, dam, levee and stripping projects, Tournapulls have proven that they can (1) move more yards per hour at (2) less equipment investment and (3) lower maintenance costs than any other type of dirtmoving equipment.

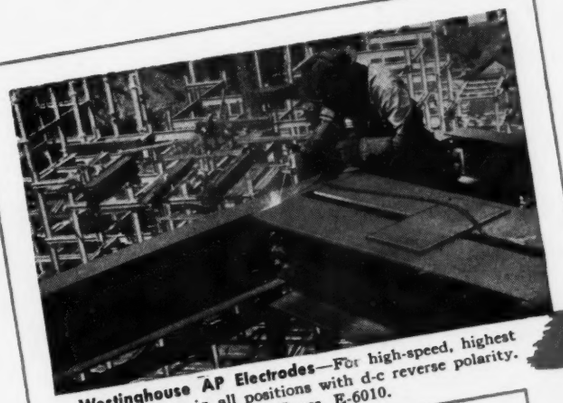
Regardless of whether you're handling long or short haul work . . . let your LeTourneau distributor help you figure your next job on the basis of low-cost Tournapull performance. See him TODAY! C23

LETOURNEAU
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

JOB-PROVED
Over 2900 Built and Shipped

TOURNAPULLS
Trade Mark Reg. U.S. Pat. Off.

FOR LOWEST NET COST PER YARD



Westinghouse AP Electrodes—For high-speed, highest quality welds in all positions with d-c reverse polarity. Meet AWS and ASTM Specs. E-6010.

5 electrodes

ARE ALL YOU NEED!

That's all you need for any type of mild steel welding. You can reduce your electrode stocks and still have the right electrode ready and available for every job.

Each of these five Westinghouse electrodes will help speed your production and assure sound welds. Slag is light and porous. Removal is quick and easy by light brushing. You'll get good flat beads, too—beads that stay put. And no matter what the position may be—downhand, vertical or overhead—arc control is easy.

Why stock more when five electrodes are all you need? For complete information on each of these five quality welding electrodes, write today for your copy of SA-740-A. Westinghouse Electric & Manufacturing Co., P.O. Box 868, Pittsburgh 30, Pa. J-21336

Westinghouse ACP Electrodes—For high-quality welds on work that is not easily positioned; a-c and d-c reverse polarity. Meet AWS and ASTM Specs. E-6011-10.

Westinghouse FP Electrodes—A high-speed, general-purpose electrode—for all types of structural steel welding. Meet AWS and ASTM Specs. E-6013-12.

Westinghouse

PLANTS IN 25 CITIES ... OFFICES EVERYWHERE

FLEXARC ELECTRODES

Westinghouse SW Electrodes—For low-current, all-position welding. Especially effective on light sections—working up or down on vertical fillets. Meet AWS and ASTM Specs. E-6013-12.

Westinghouse DH Electrodes—For high-current, a-c or d-c, flat, horizontal fillet or deep-groove, multi-pass welding. Meet AWS and ASTM Specs. E-6030-20.

TUNE IN THE
TEXACO STAR THEATRE
WITH JAMES MELTON
EVERY SUNDAY NIGHT
—CBS

TEXACO
REG. T.M.

TEXACO

SMOOTH

Rope work

DIGGING drainage channels on the desert to protect the Colorado River Aqueduct from the rare—but extremely heavy—desert rains is one of countless jobs for construction equipment in which smoothly functioning wire rope plays an essential part.

On construction jobs everywhere, smooth wire rope work is essential for efficient, trouble-free operation of draglines, shovels, hoists, etc. Knowing this, experienced contractors always keep wire rope in condition with effective lubrication—*Texaco Crater.*

Texaco Crater penetrates into and preserves the core of wire rope, preventing collapse. It seals each wire in a tough viscous film that reduces internal friction and wear, keeps out moisture, prevents corrosion. Keeps rope strong longer.

Used on open gears, *Texaco Crater* cushions load shocks, quiets noise, reduces wear. It doesn't channel or throw off, but clings to tooth surfaces, following through from gear to gear, despite high pressures and temperatures, and peripheral speeds.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed below.

Texaco Lubrication Engineering Service is available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

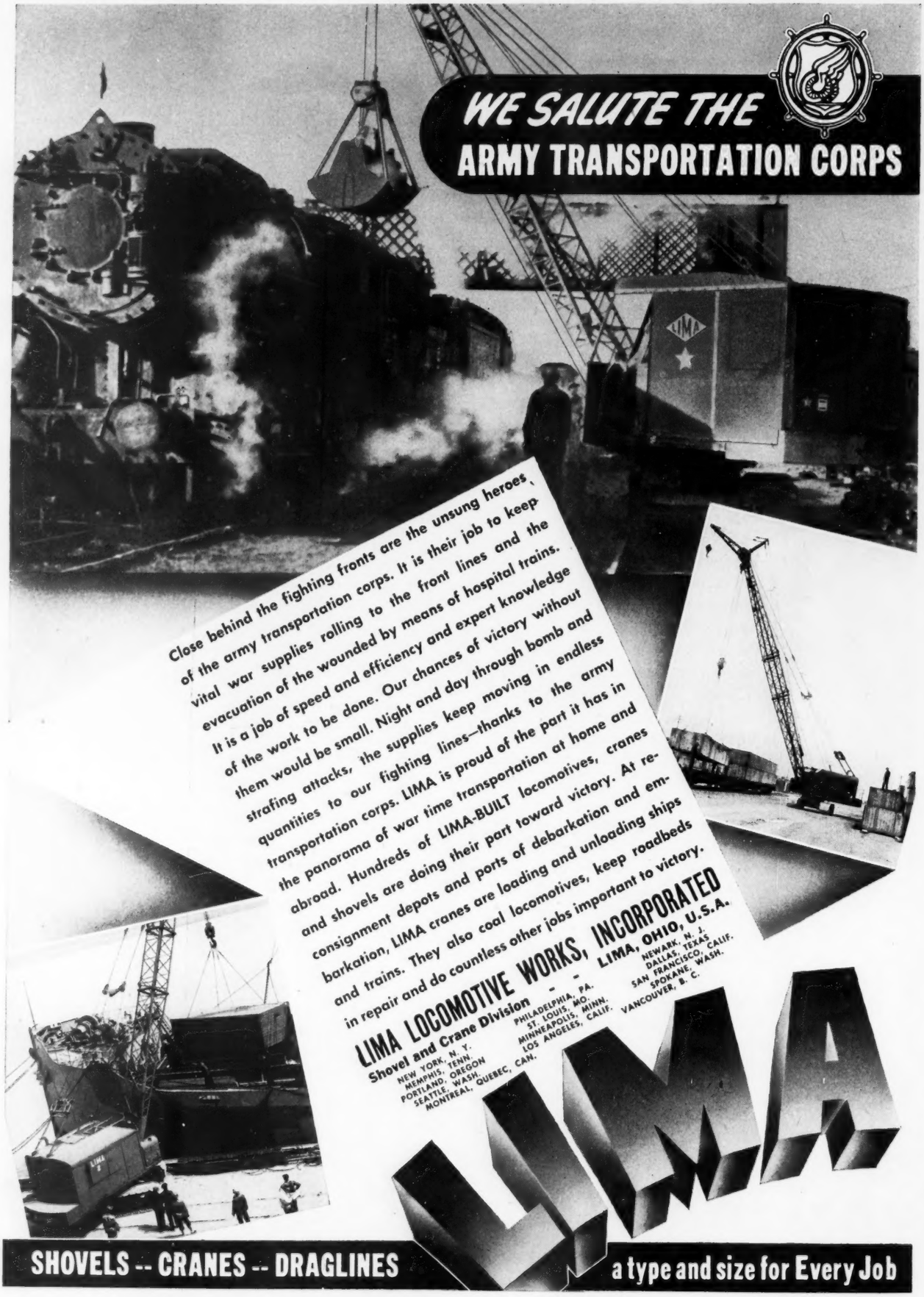
★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

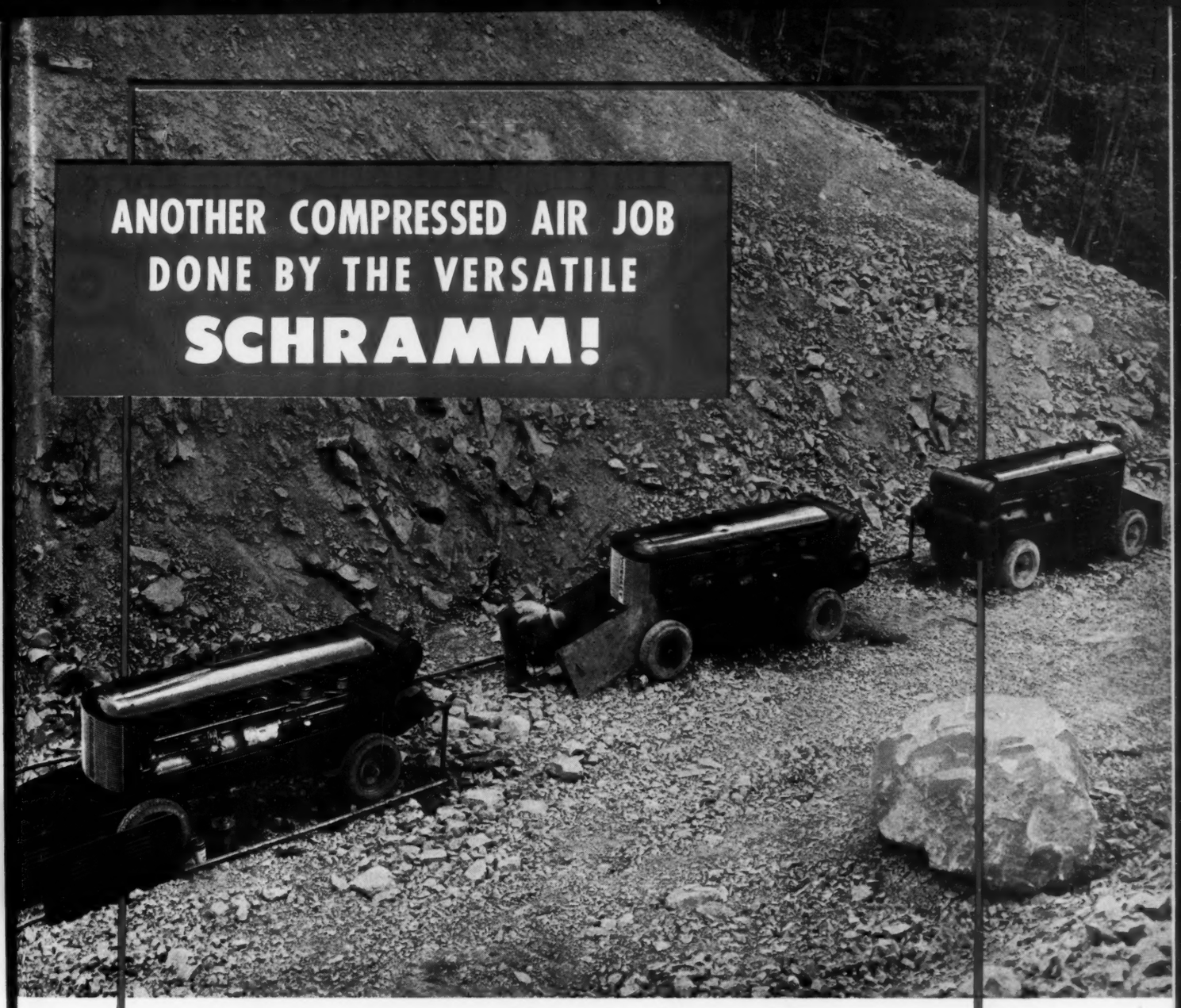
★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT


WE SALUTE THE
ARMY TRANSPORTATION CORPS
LIMA
Close behind the fighting fronts are the unsung heroes of the army transportation corps. It is their job to keep vital war supplies rolling to the front lines and the evacuation of the wounded by means of hospital trains. It is a job of speed and efficiency and expert knowledge of the work to be done. Our chances of victory without them would be small. Night and day through bomb and strafing attacks, the supplies keep moving in endless quantities to our fighting lines—thanks to the army transportation corps. LIMA is proud of the part it has in the panorama of war time transportation at home and abroad. Hundreds of LIMA-BUILT locomotives, cranes and shovels are doing their part toward victory. At re-consignment depots and ports of debarkation and em-barkation, LIMA cranes are loading and unloading ships and trains. They also coal locomotives, keep roadbeds in repair and do countless other jobs important to victory.
LIMA LOCOMOTIVE WORKS, INCORPORATED
LIMA, OHIO, U.S.A.
Shovel and Crane Division
NEW YORK, N. Y.
MEMPHIS, TENN.
PORTLAND, OREGON
SEATTLE, WASH.
MONTREAL, QUEBEC, CAN.
PHILADELPHIA, PA.
ST. LOUIS, MO.
MINNEAPOLIS, MINN.
LOS ANGELES, CALIF.
NEWARK, N. J.
DALLAS, TEXAS
SAN FRANCISCO, CALIF.
SPOKANE, WASH.
VANCOUVER, B. C.
LIMA
SHOVELS -- CRANES -- DRAGLINES
a type and size for Every Job



You can bet this construction job needed plenty of compressed air for rock excavation . . . and promptly Schramm Air Compressors were pulled onto the job!

Schramm Compressors give you plenty of air . . . easily and quickly. Four extra features by Schramm offer savings you can't afford to overlook: (1) 100 per cent water-cooled to insure ideal year-round performance; (2) forced feed lubrication; (3) electric push button to make starting easy; (4) mechanical intake valve providing positive valve action.

Schramms are rugged, yet 40% to 50% lighter in weight for easy portability. Truly, Schramm offers so many advantages, it will pay you to write for detailed information contained in a new booklet just published. Write for your free copy today.

SCHRAMM INC.

THE COMPRESSOR PEOPLE

WEST CHESTER • PENNSYLVANIA

MORETRENCH NOTES ON COMPARATIVE WELLPOINT COSTS

The use of any wellpoint dewatering system involves three major expense items:

1. The purchase or rental price of *sufficient equipment* to dewater the job *below subgrade.*
2. The cost of wellpoint installation and reinstallation as the job progresses.
3. The cost of operation.

★ ★ ★

A western Engineer had a good portable pump and a water tank. He also had a sample Moretrench Wellpoint and another make of jetting wellpoint. He thought the latter was just as good. We sicked him on to make a test and he went at it.

The final score was that the Moretrench point went down in 44% less time, used 45.6% less jetting water out of the tank, and, when pumped, put 64% more water per minute back in. He held the watch, too. Called it "a definite superiority for your wellpoint."

Now what would be the practical results of this superiority on a job? We could tell you of many instances, but the following one is well authenticated and for a sample it will do.

The contractor for a big army camp had 110 miles of wet trench to dig and for a start put on one Moretrench outfit. He then installed a dozen or so of other make units and thought he was set to go to town. But, the daily footage records for the "come latelys" were not too good, so we got a big order.

With a 100% Moretrench plant the pumping cost was cut in two, and ninety-five miles of wet trench were finished in three months.

The practical result was a saving of about a million dollars, and months of desperately needed time.

Some people have to have comparative wellpoint experience in order to find out that a cheap first cost seldom gets them "over the hump." Some people take our word for it. Some people never know.

A TEST IS CHEAP INSURANCE. WE ARE ALWAYS READY. ANYBODY WANT TO BET?

MORETRENCH CORPORATION

90 WEST STREET, NEW YORK 6

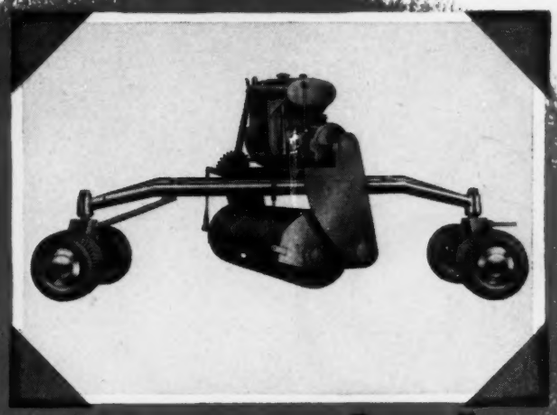
321 EUTERPE ST.
NEW ORLEANS 13, LA.

ROCKAWAY, NEW JERSEY

3037 SO. CHRISTIANA AVE.
CHICAGO 23, ILL.

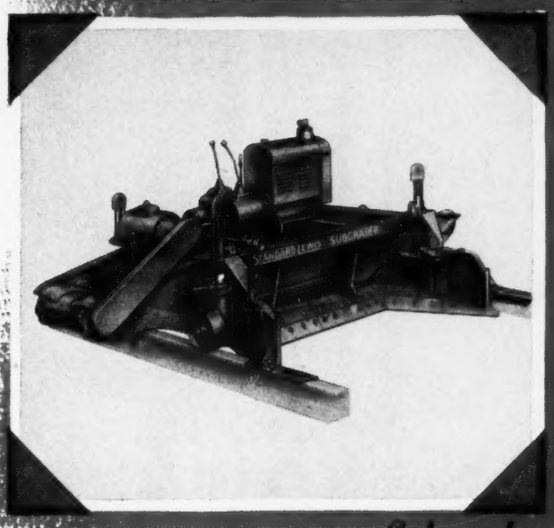
STANDARD
—A COMPLETE LINE

for Post War Construction

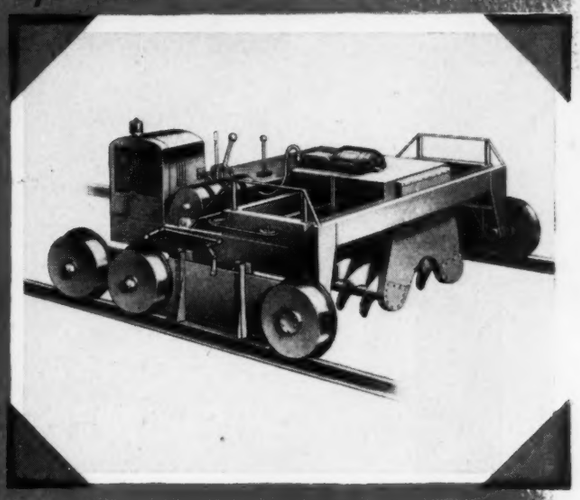


Power Broom

Spreader

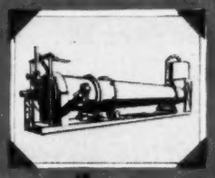


Subgrader



Concrete Finisher

Asphalt Plant



Dryer

Roller

Batching Plant

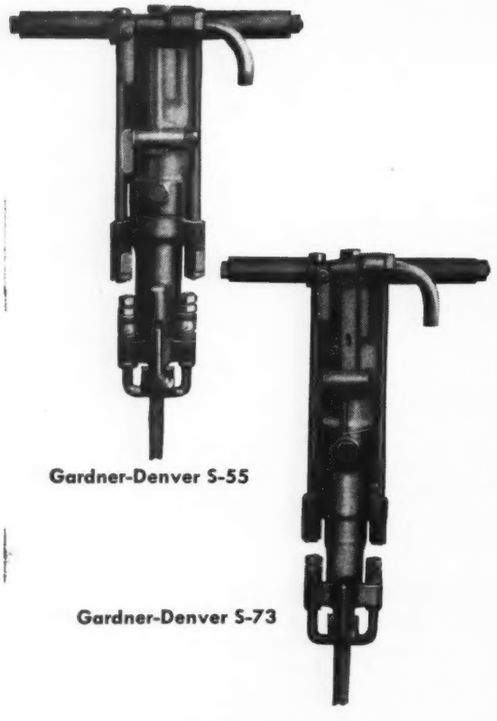
Here at Standard Steel we are working "around the clock" on war production. Nevertheless, we believe it a patriotic duty, as well as a practical necessity, to plan now for tomorrow. Postwar demands in the construction field will call for modern and effective equipment. An engineering background of more than twenty years experience in the paving equipment field is evident throughout the entire design in the Standard Steel line. Contractors are thus assured efficiency and sturdiness which mean greater profits. The *complete* line enables Standard's distributors to offer *complete* service to paving contractors. *Write for Bulletins S2 and S5.*

BUY WAR BONDS...AND KEEP THEM

STANDARD
STEEL CORPORATION

General Offices and Plant: 5001 South Boyle Avenue
Los Angeles 11, California

CLEAN



Gardner-Denver S-55

Gardner-Denver S-73

HOLE CLEANING! That's the real test of a sinking drill.

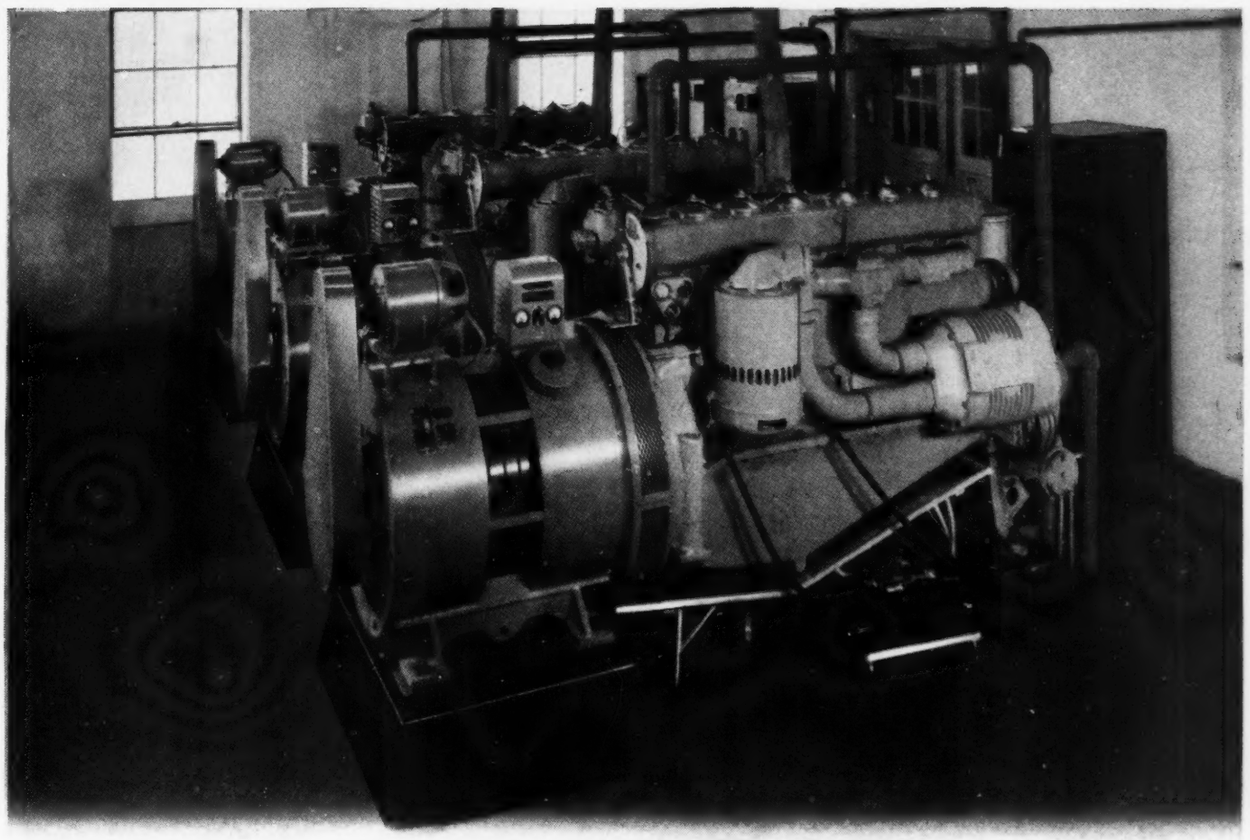
Exceptional hole cleaning ability is a "must" feature of Gardner-Denver Sinkers. In hard or soft ground, they keep the hole clean . . . permit faster footage per shift. Open the blower valve, and a powerful stream of air under full line pressure blasts every bit of material out of the hole . . . fast.

Gardner-Denver Sinkers are easy riding . . . perfectly balanced to assure the easy holding that cuts down operator fatigue. From the 31-pound S-33 to the 80-pound S-79, Gardner-Denver Sinkers help speed job progress.

* * *

For complete information on Gardner-Denver Sinkers, write for descriptive bulletins.
Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER *Since 1859*



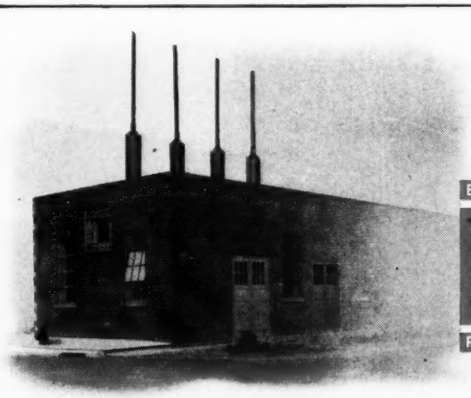
More Power for the Same Space Because of *Supercharging*

Industries bulging with war orders needed more power than the municipal plant at Hartford, Wisconsin could supply.

To meet the problem, Hartford Utilities purchased three Murphy Diesel Generating sets. In order to get the maximum performance and flexibility from the investment and in the space available, these engines were engineered with B-W Superchargers, for a combined capacity of 345 KW.

B-W Supercharging increases engine performance and flexibility without corresponding increase in size because it delivers more air to cylinders than the pumping action of the pistons would normally draw in. More fuel can be burned, and more power developed.

Each passing month furnishes additional evidence of the value of B-W Supercharging for providing more power in a given space . . . to compensate for loss of power at higher altitudes . . . to improve performance of marine, industrial, transportation, and automotive engines, both gasoline and diesel.



In this corner building, three Murphy Diesels, as shown by the three blackened stacks, occupy only 44 square feet of floor space each, to develop 345 KW.

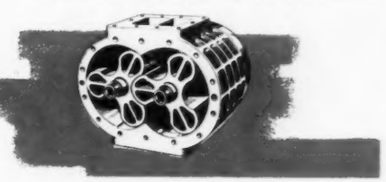
ENGINEERING B-W PRODUCTION

SUPERCHARGERS, INC.

3412 WEST CAPITOL DRIVE

A DIVISION OF BORG-WARNER

Milwaukee 9, Wisconsin



B-W Positive Displacement Superchargers supercharge at all speeds and in proportion to the need of the engine for air.

HARD-FACED...

FOR A TOUGH JOB

By large majority, companies in the construction field now standardize on hard-facing materials in maintenance and salvage procedure, a recent survey revealed. Particularly for equipment in use as above, it showed that for a few minutes welding time and a few cents for MIR-O-COL hard-facing metals, resurfacing of digging, surfacing and traction machine wear points resulted in many advantages. Better performance of the entire equipment string was noted. The hard-faced parts did not deviate from original sharpness and trueness. Thus power and operating costs per hour of use were lowered — production continuity assured over a long period — further proving that MIR-O-COL rods possess "Tough Hardness."

Manufactured by

MIR-O-COL
HARD-FACING RODS
ALLOY COMPANY

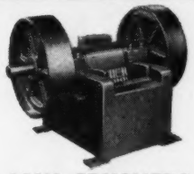
AT YOUR REQUEST a copy of "Weldors Guide to Successful Hard-Facing" will be sent FREE

2416-60 EAST 53RD STREET, LOS ANGELES, CALIFORNIA

PIONEER

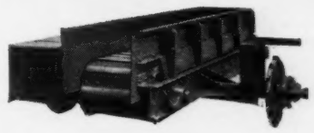
ROCK, ORE and GRAVEL CRUSHING · SCREENING · WASHING · HANDLING

Plants and Equipment



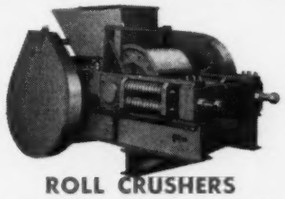
JAW CRUSHERS

Overhead eccentric type for primary crushing. Will handle large material, has downward and forward crushing action. Sturdy design for high tonnage capacity.



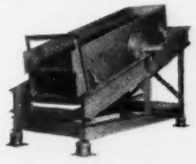
FEEDERS

Regulate flow of material to crushers to assure continuous high production. Medium and heavy duty types, horizontal or inclined; will bypass undersize.



ROLL CRUSHERS

For secondary crushing and fine reduction. Star gears driven by belt and countershaft; manganese shells and anti-friction bearings Delivers large tonnage, accurately sized.



VIBRATOR SCREENS

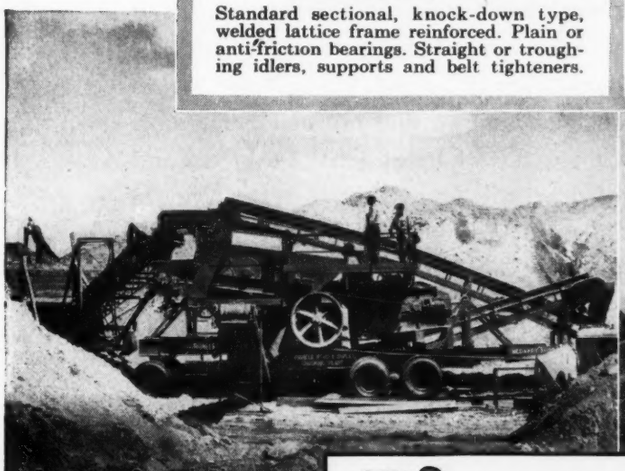
Positive, uniform agitation. Circular motion for fast, accurate screening. Perfectly balanced, 4 SKF bearings for smooth operation; long life. Sagless, replaceable screens.

BELT CONVEYORS AND ACCESSORIES

Standard sectional, knock-down type, welded lattice frame reinforced. Plain or anti-friction bearings. Straight or troughing idlers, supports and belt tighteners.

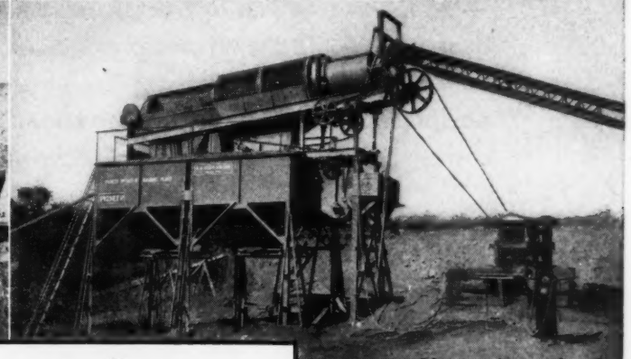
REVOLVING SCREENS

Portable or stationary types, adapted for scalping, washing, scrubbing and sizing, also for dehydrating. Available with spray pipes, conveyors, sand jacket, bins.



Portable Gravel Plants

Have primary and secondary crushers, screen and conveyor. Produce aggregate for road surfacing and other construction. Available in 5 sizes, capacities to 300 t.p.h. Washing and dehydrating equipment optional.



Portable Washing Plants

Washes, screens and dehydrates to produce sand and several sizes of aggregate. Crusher optional. Pioneer also builds portable and stationary quarry plants, as well as travel-mix and central mix bituminous plants.

Pioneer

ENGINEERING WORKS

Jaw Crushers · Roll Crushers · Screens · Conveyors · Feeders · Washers

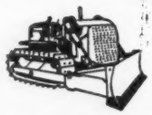
ENGINEERS AND MANUFACTURERS of QUARRY, GRAVEL AND MINING MACHINERY

MINNEAPOLIS 13, MINN

SPOTTING THE MARK

That Means LOWEST POSSIBLE COST PER YARD . . . PER TON . . . PER ACRE !

When the time comes to buy new equipment for tomorrow's earthmoving and land clearing jobs, it will pay you to remember the mark LPC, as your guide to lowest possible cost. For LPC stands for LaPlant-Choate —the *job-proved* line of tractor equipment that's known and respected the world over for its outstanding performance on *thousands* of tough jobs. Designed and built by "specialists" with over *34 years* of practical "know-how," LaPlant-Choate equipment will continue to be a step ahead in improvements that assure *lowest possible cost per dollar invested*. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.



ALL TYPES OF DOZERS*— Straight or angling blade, hydraulic or cable operated, for every size of track-type tractor.

LARGE OR SMALL SCRAPERS —Hydraulic or cable operated, front or rear dump, for use with wheel or track-type tractors.

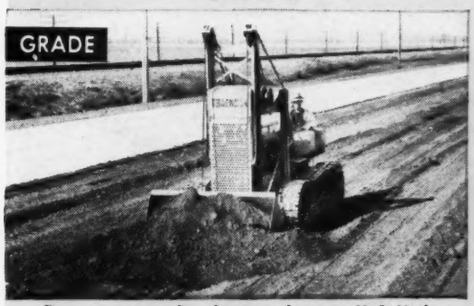
CABLE OPERATED RIPPERS— For ripping up hard ground, shale or concrete to facilitate loading with "Carrimor" Scrapers.

LAND CLEARING TOOLS—A complete line of Brush Cutters, Treedozers, Rootcutters and Brush Rakes—all interchangeable.

LAPLANT CHOATE
EARTHMOVING AND LAND CLEARING EQUIPMENT

* Again in '44, LaPlant-Choate delivered more dozers to the armed forces and other essential users than any other company in the industry—almost as many as all the other manufacturers combined

Traxcavator digging up old street surfacing in a Virginia town.

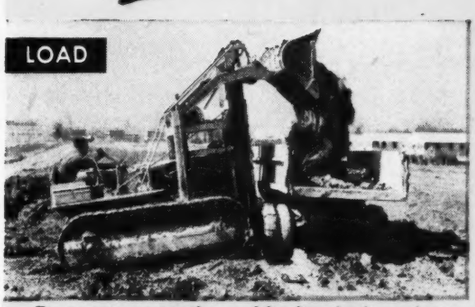


Traxcavator grading between lanes on U. S. Highway 30, near Valparaiso, Indiana.

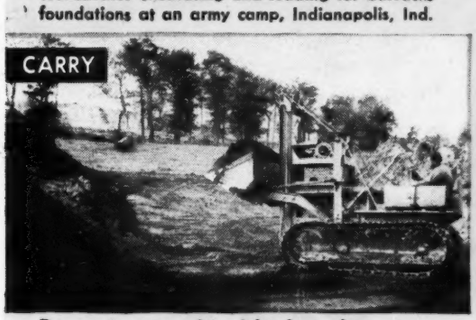
OPERATORS KNOW THE WORD FOR IT —

"TRAXCAVATING!"

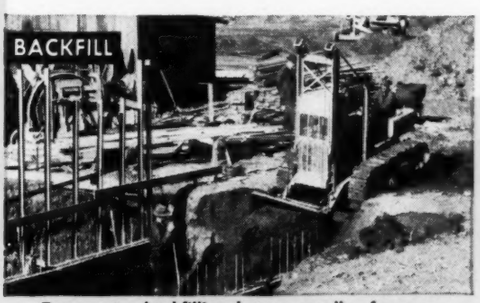
TRAXCAVATORS do so many tasks well that operators coined a word to cover all of them. It's "Traxcavating!" It fits TRAXCAVATORS like a glove, for these multi-purpose machines, powered by "Caterpillar" track-type tractors, dig, grade, load, carry and do many other earth-moving and material handling jobs easily, quickly and at low cost. Ask your Trackson — "Caterpillar" dealer how TRAXCAVATORS can help you, or write to TRACKSON COMPANY, Dept. CM55, Milwaukee 1, Wis.



Traxcavator excavating and loading for barracks foundations at an army camp, Indianapolis, Ind.



Traxcavator preparing right-of-way for a cross-country pipe line in Illinois.



Traxcavator backfilling between walls of a percolating dam at San Jose, California.

TRAXCAVATOR

REG. U. S. PAT. OFF.

DIGS

GRADES

THE ORIGINAL TRACTOR EXCAVATOR

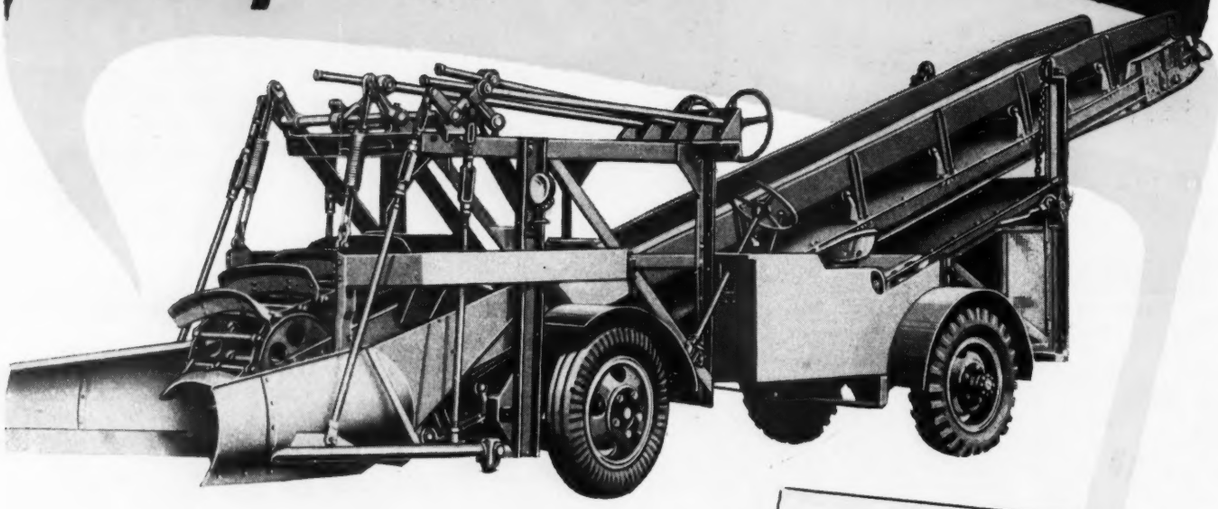
LOADS

CARRIES

HIGHWAY ENGINEERS ACCLAIM MANY *War-Time* USES OF

★

Athey FORCE-FEED LOADER



Here's What They're Saying

"Just the tool we've wanted."

"Speeds every one of our loading jobs."

"There's nothing else like it."

"Simplifies our highway maintenance problems."

"It's a lifesaver these busy war days."

"Keeps our roads better maintained than ever before."

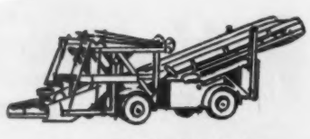
Busy highway departments are turning away from hand and other obsolete, costly loading methods . . . finding the modern, Athey Force-Feed Loader a versatile piece of equipment for many wartime maintenance jobs.

Operating as a companion tool with your "Caterpillar" Motor Grader, the Athey Force-Feed Loader is a self-propelled, one-man operated outfit designed to help solve your manpower problems and speed the removal and salvage of surplus material on highway maintenance and construction.

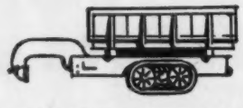
You'll find the Athey Force-Feed Loader an economical, fast, clean tool for handling surplus material in ditch cleaning, road widening and straightening, slope trimming, road grading, building and relocating ditches, salvaging topsoil, and loading oil mix.

Investigate the Athey Force-Feed Loader for your highway maintenance work. See your Athey-"Caterpillar" dealer today, or write direct to Athey Truss Wheel Co., 5631 West 65th Street, Chicago 38, Illinois.

Athey



FORCE-FEED LOADER



FORGED-TRAK TRAILERS

MOBILOADERS

DEPENDABLE LOADING & HAULING EQUIPMENT

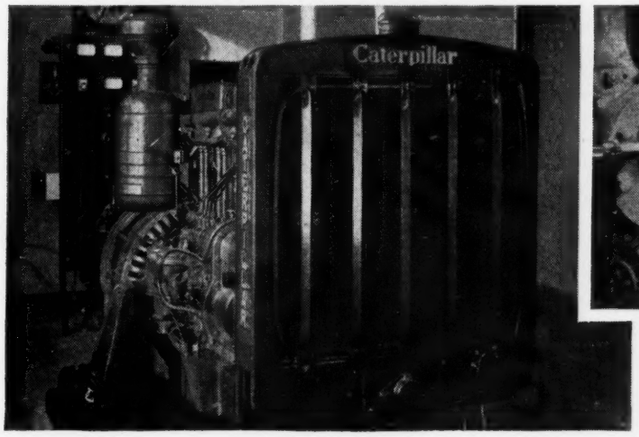
THE YEARS TELL THE *Story of their life*

WHEN you buy a "Caterpillar" Diesel Engine,* it won't take you long to discover the size of the load it can handle. Or the amount of machinery it can drive. Or the smoothness with which it runs. Or the little attention — and practically no adjustments — it requires. Or the amazing amount of power it can wring out of a gallon of low-grade, low-cost fuel.

For these things can be measured. Or seen. Or figured in economical dollars and cents.

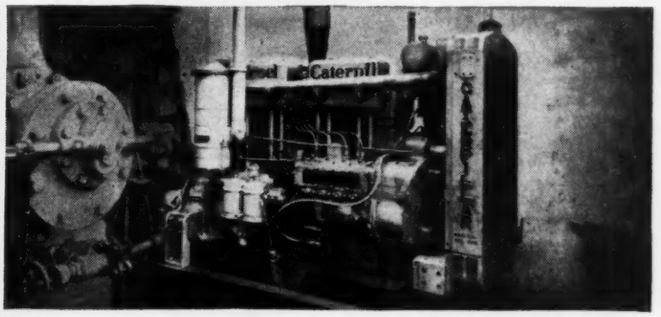
But to estimate its maximum serviceable life would ordinarily be a matter of waiting — for years. Today, however, you can judge pretty closely by the records of plenty of other engines just like it . . . work engines that have "been through the mill" and have many thousands of hours of actual running behind them. Cited here are just a few of such records.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



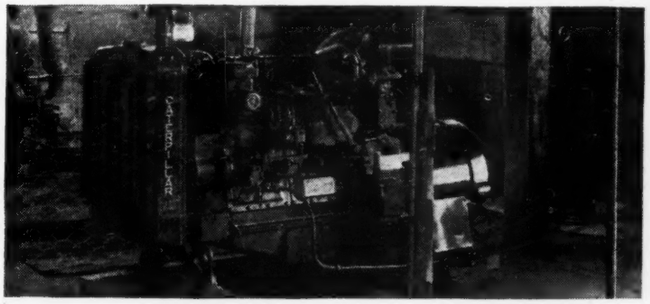
21,400 HOURS

This "Caterpillar" Diesel Electric Set was installed nearly seven years ago as an emergency lighting plant at the Syracuse Airport. Required only 12c worth of repairs during its first 3½ years of service.



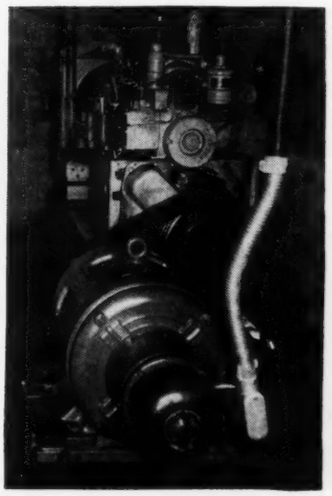
65,000 HOURS

A "granddaddy" among "Caterpillar" Diesels, this D7700 drives an ammonia compressor used in cooling two rooms for the A. J. Krecker Co., Chicago. Record includes 9000 hours of almost continuous running with little or no maintenance expense.



34,400 HOURS

This "Caterpillar" Diesel D4400 powering electric generator was installed in 1940. Operates 24 hours a day furnishing light and power for the town of Haswell, Colo.



32,000 HOURS

This record was made by this "Caterpillar" Diesel D4400 in exactly 5½ years, producing power for incubators, battery brooders, water pumps, lights, etc., for the Bolton Farms Hatchery, Schoeneck, Pa. Runs 24 hours a day, seven days a week, and is seldom shut down more than once in two weeks.

CATERPILLAR DIESEL ENGINES

REG. U.S. PAT. OFF.

* The horsepower of "Caterpillar" Diesel Engines is ALL WORKPOWER. Ratings show sustained output of a fully equipped engine—not the momentary peak performance of a power-plant stripped of fan, pumps or other necessary accessories.

TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

New rope or old . . . you want

SAFER HANDLING

. . . Men and equipment need the increased protection of *PREFORMED* YELLOW STRAND

"Wire rope *safety?* Well," someone says, "we caution operators . . . keep equipment in repair . . . select rope of adequate strength and proper wire-and-strand construction. What's missing?" Just one thing: see that the rope is *Preformed* Yellow Strand.

Yes, this flexible, kink-resistant line that doesn't go out of control adds to safety. Its *manageability* comes from the factory *preforming* that dispels the inner tension of parts.

If you're cutting, splicing or reeving a rope, the same docility eliminates the necessity of serving the ends. Wires and strands that don't unravel are safer to handle.

And when long-lived *Preformed* Yellow Strand eventually nears retirement, still another safeguard appears. Surface wires that wear through are disposed to lie flat and remain harmless. They don't follow the unpreformed tendency to wicker out in jagged points, endangering workers' hands and adjacent wires, sheaves and drums. Men use *preformed* rope confidently, efficiently.

Specify *Preformed* Yellow Strand by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

HAND BOOK FREE: "Industrial Wire Ropes" contains useful facts, tables, pictures. Write for your copy.

ARMY E NAVY

BRODERICK & BASCOM

Yellow Strand

PREFORMED WIRE ROPE

Fabricated on the Drawing Board

Contrast this *Alcoa extruded shape* with the structural member you'd have to build up to do a comparable job.

Possibilities of the extrusion process surprise the uninitiated. Extrusions save on fabricating labor. They often simplify a design, saving more weight and giving it greater use-value.

Aluminum is employed most efficiently, being placed exactly where needed for utility and strength. No excess metal for joining purposes. No rivets to add extra weight.

Dies for the extrusion of aluminum are very reasonable in cost. Our engineers will gladly discuss the shapes you need and help you figure what you'll gain by going to Alcoa Aluminum extruded shapes. ALUMINUM COMPANY OF AMERICA, 1865 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

"Revive" Failing Sewers

THIS EASY, PERMANENT WAY

Relining failed sewers is easy and quick — and permanent — with long lengths of sturdy Asbestos-Bonded ARMCO Pipe.

★ ★ ★

You can give failing sewers many more years of useful life by relining with durable, easy-to-install Asbestos-Bonded ARMCO Pipe. Job costs are low and the work moves fast. Long lengths of pipe, quickly joined with special inside band couplers, speed the job. Waterway is reduced a minimum because of the relatively thin walls of the corrugated pipe.

Fast as the work goes, you build for *permanence.* Flexible corrugated metal outlaws breakage. Corrosion is shackled by a full bituminous coating tightly bonded to the base metal. A thick bituminous pavement checks erosive action of sewage; makes the bottom last as long as the top.

Use Asbestos-Bonded ARMCO Sewer Pipe for essential repairs now, and design it into your post-war sewerage work. That way you "build for keeps" — provide your community with efficient, lasting, trouble-free sewerage. Our 48-page ARMCO Sewer Booklet will help you in your planning. Just write to Armco Drainage Products Association, 45 Curtis St., Middletown, Ohio.

ARMCO

ASBESTOS-BONDED ARMCO SEWER PIPE

TILL THE JAPS SAY "UNCLE"

AMERICA bounced back hard in this war against the Japs, and the boys who led the rebound were *United States Marines.*

Ever since Guadalcanal the Marines have proved that boys from Kokomo, the Ozarks and the Bronx—when steeped in Marine Tradition, skilled with Marine training—are dog-gone good fighters. On beachhead after beachhead—in jungle after jungle—they were far outnumbered by the Japs. But not outfought.

On they go, those Marines, on land and sea and in the air . . . outsmarting, outshooting, outkilling the enemy—till the Japs say "Uncle."

They have good equipment, sure. Most of the thousands of trucks they use, for example, are Internationals. And most of the thousands of bulldozing tractors they use are Internationals, too. Trucks and tractors—vital weapons in this grim, modern war!

But proud as we are that Harvester has been able to make equipment rugged enough to fight with the Marines, we know that the real fighting machine in this march to Tokyo is the Marine himself. What a machine! All speeds forward . . . none reverse. Tough . . . rugged . . . smart. A superlative fighter. A superb citizen.

We humbly and proudly salute those boys from Kokomo, the Ozarks and the Bronx, who are *fighting* up to their glorious motto—Semper Fidelis.

INTERNATIONAL HARVESTER COMPANY
180 N. Michigan Ave. Chicago 1, Illinois

WHERE THE MARINES FOUGHT

From Guadalcanal the Marines started marching in giant strides toward Tokyo—sweeping clean the island stepping stones to Victory.

The Russell Islands, Segi Point, Viru Harbor, Rendova, Vangunu, Rice Anchorage, Enogai Point, Munda, Vella Lavella, Choiseul, Empress Augusta Bay.

On to Tarawa, the island that the Japs said couldn't be taken.

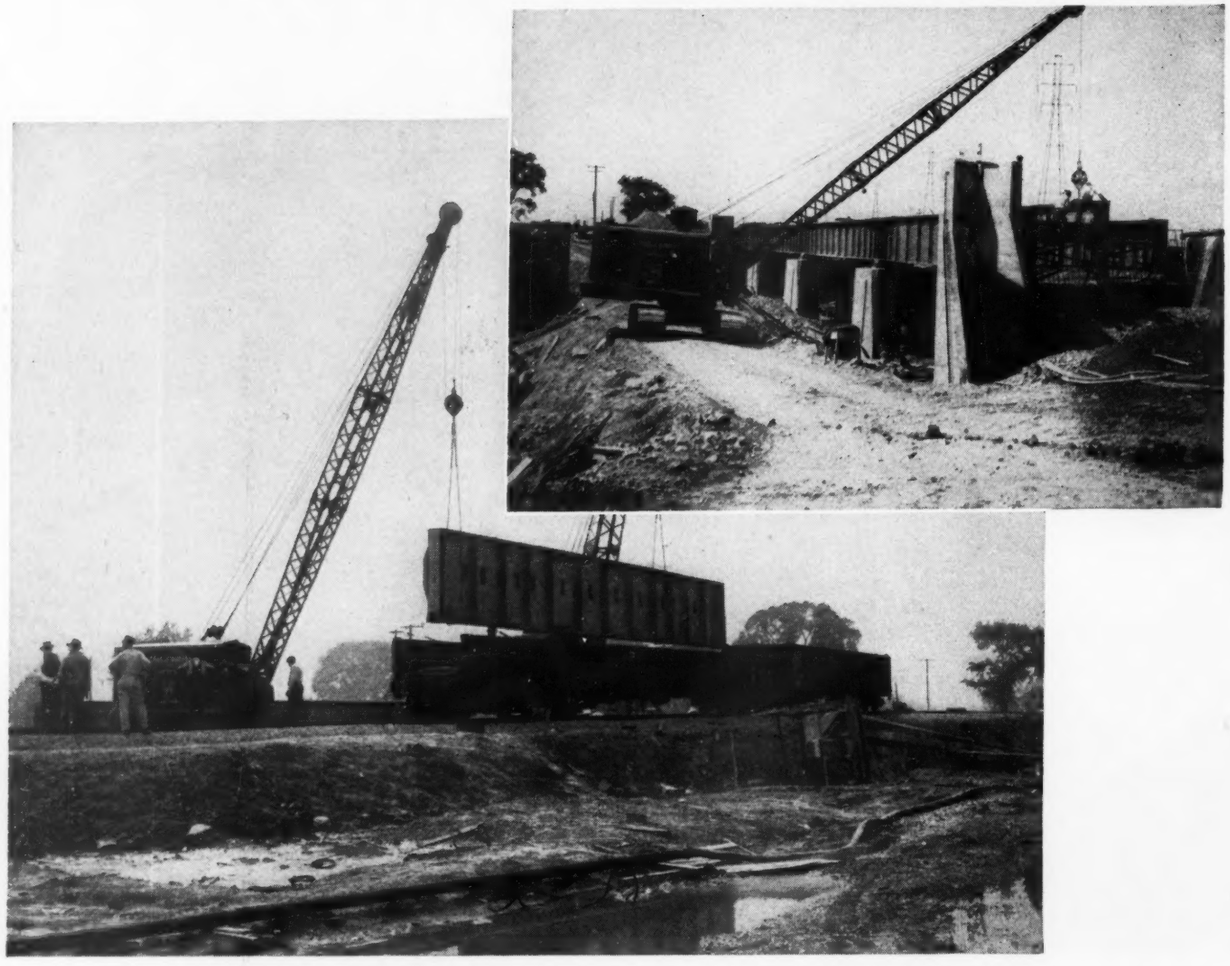
Cape Gloucester. Then Majuro, first pre-war Jap territory to fall to U. S. fighters. Roi, Namur, and other islands in the Kwajalein atoll.

Eniwetok atoll. The Marianas—Saipan, Guam, Tinian. Peleliu, in the Palau Islands. Iwo. Okinawa.

Closer . . . closer to Tokyo.

INTERNATIONAL HARVESTER

Power for Victory . . . Power for Peace



It is only natural to find

Chas. J. Rogers, Inc., *as one of the contractors for*

DETROIT INDUSTRIAL EXPRESSWAY

Yes, when big contracts are let it is only natural to find Chas. J. Rogers, Inc., on the job with his "fleet" of BAY CITY shovels and cranes. But, regardless of whether your job is large or small there will be, after the war, a BAY CITY of the right size and capacity to fit your needs and give you efficient performance and economical operation. If you have not kept pace with the many operating advantages which are standard in this line of fast, powerful convertible shovels and cranes (either crawler or pneumatic tire mounted), see our nearest distributor. He will be glad to give you complete information and work with you in making plans for your equipment set-up to handle your share of the big volume of postwar activities. Can we be of any assistance? BAY CITY SHOVELS, Inc., Bay City, Mich.

ARMY E NAVY

BAY CITY SHOVELS
12 Sizes
⅜ to 1½ Yard
Also truck mounted shovels and cranes

BAY CITY

SHOVELS • CRANES • DRAGLINES • TRENCH-HOES • SKIMMERS

the Job—
Pouring 40,000 yards of concrete with a record of 792 Cubic Yards in 9 Hours
the Equipment
This 34E
MultiFoote Paver

ANOTHER hurry-up job, completed in record time with the usual MultiFoote efficiency, was the building of a West Coast military airport access road requiring 40,000 cubic yards of concrete. Typical of the high hourly production of all MultiFoote 34E Pavers was the pouring of 792 cubic yards of concrete in a nine-hour period.

Note particularly the operator on his high platform which makes possible faster, more accurate work. At the widest angle of the boom the bucket is visible, the pan of the skip is in view and its full width can be seen without stretching around machinery. A simple control system gives an automatic mixing cycle that utilizes every mechanical advantage for speed. This mechanical cycle can be varied at the will of the operator from automatic to manual operation at any time, allowing him to take full advantage of any condition that might develop. Add to this all the other MultiFoote features and you have the reason why there are more MultiFoote pavers than all others. See your local dealer or write for details.

THE FOOTE CO., INC.

1910 State Street **Nunda, New York**

ARMY E NAVY

MULTIFOOTE

ADNUN BLACKTOP PAVER

CONCRETE PAVERS

HERE'S EXPER

The SOCONY-VACUUM REPRESENTATIVE brings you the most Complete Lubrication Service ever offered Contractors—Designed to save time on the Job, in your Maintenance Department—all through your operation!

SOCONY-VACUUM OIL CO., INC., and Affiliates:
Magnolia Petroleum Co., General Petroleum Corp. of Calif.

IENCED HELP!

● When you buy oils and greases—do you get *real help in meeting contract deadlines?* That's what this new Socony-Vacuum service offers!

Along with our complete line of quality lubricants—the exactly right oil or grease for every piece of equipment you operate—you get practical maintenance and engineering aid...the kind that helps speed up your entire operation.

For instance, we supply you with job-tested maintenance schedules, plans and surveys especially geared to fit your individual requirements. The Socony-Vacuum Representative works with your men—helps analyze and solve time-losing problems—steps in when needed with skilled technical help!

You get dependable, on-the-job delivery service that assures you the products you need on *time*... saves costly interruptions, reduces inventory problems . . . relieves you of bothersome detail.

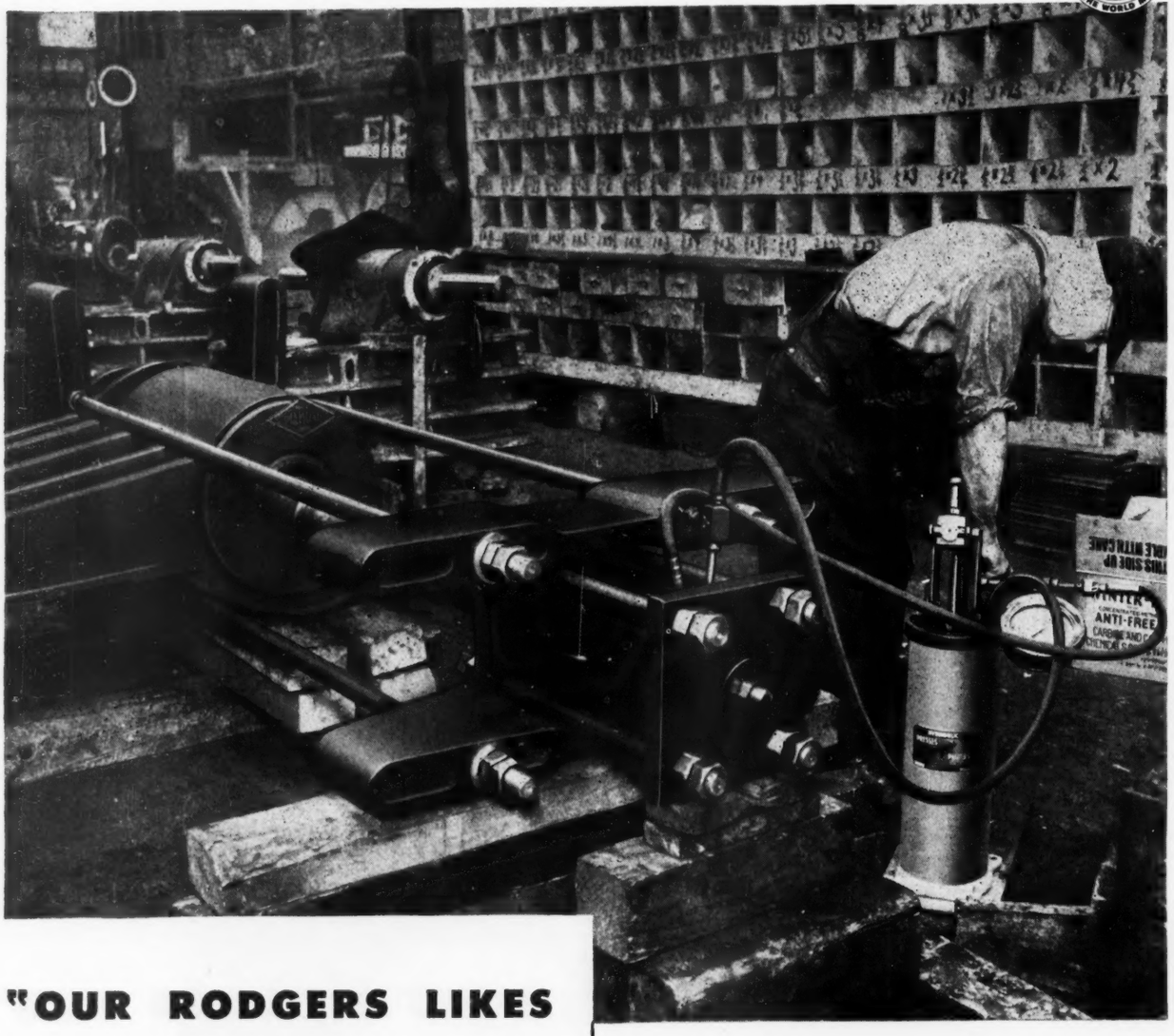
When you team up with Socony-Vacuum, expect far more than just fuels and lubricants. You'll get *complete service*—down-to-earth, practical help with every maintenance headache on the job!

"ON YOUR STAFF—BUT NOT ON YOUR PAYROLL"—
Your Socony-Vacuum Representative

CORRECT LUBRICATION FOR EVERY PART OF EVERY MACHINE YOU OPERATE . . .
PLUS
1 ENGINEERING HELP on time-losing operating problems; 2 TESTED MAINTENANCE SCHEDULES that minimize service man-hours—keep equipment on the job; 3 PROMPT, DEPENDABLE DELIVERY—a reliable, on-the-job service that eliminates inventory problems for you!

TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS, 9:30 E.W.T.—NBC

NO. 26 OF A "READY-WITH-A-RODGERS" SERIES



"OUR RODGERS LIKES THEM BIG AND TOUGH"

Diamond Iron Works, Inc.

Rodgers special 200-ton unit forcing bearings and sleeves from the pitman of a Diamond rock crusher.

"With 200 tons of push behind it, our Rodgers Universal Press really does a job, servicing our equipment. Removing bearings and sleeves on the crusher pitman shown in the photograph was simply a matter of setting up and letting the Rodgers take over."

The Diamond Iron Works Inc., Minneapolis, relies on its Rodgers Universal Press. Like other users, it appreciates the portability and adaptability of the Rodgers, which does the job wherever pressing, pulling, or lifting power is needed. For complete information and prices, write or wire Rodgers Hydraulic, Inc., 7403 Walker Street, St. Louis Park, Minneapolis 16, Minnesota.

If It's a Rodgers, It's the Best in Hydraulics

Uses for RODGERS UNIVERSAL HYDRAULIC PRESS

Pulling Gears • Sprockets • Pulleys • Couplings
Sheaves • Drums • Wheel Press Work • Jacking
Pipe • Erecting Machinery • Relocating Machinery
All-Purpose Jack

RODGERS HYDRAULIC, Inc.

because it digs, SWINGS, hoists and dumps in ONE continuous movement

Loads Trucks *3 TIMES FASTER*

This all-purpose Loader fills a long-felt need for contractors, highway depts., counties, municipalities, quarries... With 180° swinging boom and power-closing bucket it loads to either side in one continuous movement—with 11 fewer clutch moves, in 1/3 the usual time... NO MANEUVERING — WORKS IN TIGHT PLACES . . . Crowding power is tremendous — with 65 h.p. engine in ¾ m.p.h. low gear and 80% of load on giant front driving wheels it can dig into any material, backfill, grade, do prime moving and light excavating . . . And with 6 traction speeds and power steering it travels to jobs anywhere at 15 m.p.h.

Send for 52 page Catalog JL-5, showing a hundred year 'round uses and advantages. THE JAEGER MACHINE COMPANY, 800 Dublin Avenue, Columbus 16, Ohio.

FLEETFOOT

JAEGER LOADER

CRANE and EXCAVATOR

½ to 2 Yd. Buckets, Quickly Interchangeable—Handle Any Material from Rock to Snow

12-25 Ft. Crane Attachment

Grades, Backfills, Cleans Up; Loads Earth, Coal, Snow

Can Dig Outside Its Wheels . . Can Dig 3 Ft. Below Grade

Now LAY·SET P

is

The new GREEN LUBE, made to Hazard's own specifications, clings to the wires better, thereby affording increased protection. Wires wear longer; the entire rope gives longer service. That is why every strand in **LAY·SET** *Preformed I.P.S. is packed to the point where every void is completely filled with this superior lubricant.*

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Co

HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE

ACCO TRADE MARK

In Business for Your Safety

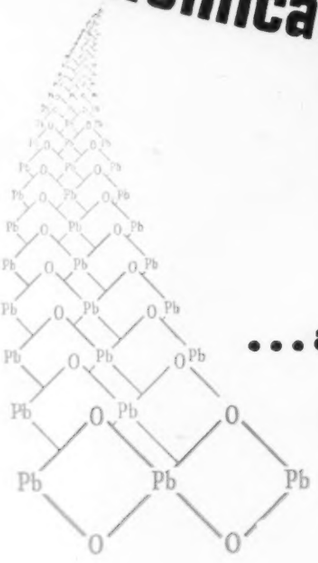
PREFORMED I.P.S.*

ALL GREEN!

Here is the ultimate in wire rope perfection. ... Hazard **LAY·SET** Preformed made of Improved Plow Steel* ... every strand of which is literally stuffed with our superior green lubricant ... the best of all rope made still better by the more adhesive green lubricant which coats every wire.

★ ★ ★ ★ ★

Uniformity of Chemical Composition...



...another real reason why RED LEAD means Extra Protection against Rust

Red Lead's outstanding uniformity of performance results not only from its extreme purity but also from its precise chemical composition... lead orthoplumbate. This makes for predictable chemical behavior.

For many years Red Lead has been the standard among metal protective paints because of inherent fundamental properties of the pigment itself.

Among the most important of these is Red Lead's definite chemical composition and uniformity—as distinguished from pigments which have indefinite composition or vary from batch to batch, with resulting possibility of variation in performance.

One reason for this uniformity is that Red Lead is a simple chemical compound, being made from oxygen and high purity metallic lead. Consequently, Red Lead is an extremely pure compound. It contains no corrosion accelerating impurities such as water-soluble salts of chlorides or sulfates.

Uniform composition means dependable performance, day after day, job after job.

Furthermore, Red Lead has the property of counteracting acid conditions, recognized as accelerators of rust. In the presence of various acids, Red Lead forms insoluble neutral lead salts at the approximate rate at which the acids are supplied. This is true whether the acids originate from acid forming environments, such as gas, smoke and moisture in the atmosphere, or from the decomposition of the vehicle. Thus, a rust inhibiting condition is maintained with a Red Lead paint.

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify RED LEAD for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

Write for New Booklet

"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas. If you haven't received your copy, address nearest branch listed below.

* * *

The benefit of our extensive experience with metal protective paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna.); Philadelphia 7 (John T. Lewis & Bros. Co.)

DUTCH BOY RED LEAD

Q Will You Be All Set to Meet The Competition Ahead?

A You certainly want to be. One way is to have equipment that gets out more work. One contractor suspected that his machines were shut down too long for lubrication, thus costing him production. He got an Alemite Portable Service Station and now he lubricates track roller bearings in 2½ seconds while the machine is on the job. He fills transmissions and final drives at the rate of 14 pounds per minute. The result—his machines stay on the job and get out more work per day.

Q How does "M. P. T."* make low bids more profitable?

A It's as simple as A-B-C. For instance, by making each machine more productive, you cut your costs. For instance: with power lubrication brought to machines on the job, one contractor reduced track roller and other bearing expense 25%. Shut-down time was saved and put back into production. Consumption of lubricants dropped nearly 20%. That's more expense saved. Lubrication time was cut more than 30% . . . 30% more productive time for his machines.

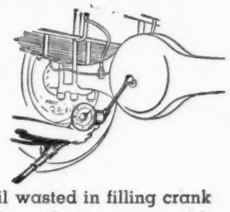
**More Productive Time*

Give Yourself The Advantages of Alemite Portable Power Lubrication

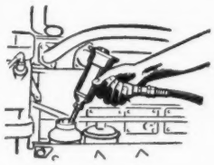
● With Alemite Portable Service Stations you bring power lubrication to the machines while they're working. You save valuable time and reduce expensive bearing failures due to faulty lubrication.

Alemite Portable Service Stations come complete with high and low-pressure Alemite Barrel Pumps, Oil Dispenser, hose reels and gas engine air compressor. The money, time and machines they save can help you make *any* contract *more* profitable.

Fast, easy lubrication of track rollers and all bearings having pressure gun fittings—which covers practically every type of machine.



Quick and metered dispensing of gear lubricants to gear housings, transmissions, final drives, etc.



No time or oil wasted in filling crank cases, or other oil containers, with the amounts desired.

Air line equipment for tire inflation, air jet cleanings, engine cleaning, paint spraying, etc.

FREE! Illustrated catalog describing Alemite Portable Service Stations. Also, complete catalog of individual Alemite lubricating equipment. Send coupon below for your copies today!

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ALEMITE

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CONSULTATION • ENGINEERING • EQUIPMENT
LUBRICANTS • MAINTENANCE

then he said to himself

"Phooey on every good thing"

FEW men are more widely known, and more genuinely detested, than Fuehrer Vidkun Quisling.

. . . and yet few are his orations by which to measure him.

Recently, however, as the Church gained ascendency in Norway, he resorted to a three-word outburst which pictures his double-cross mentality to a T. Says he:

"Religion is outdated."

Well he knows in his stony heart and warped soul that the advance of religion is something that will undo him

. . . so he ridicules it rather than accepts it.

Since when has he ever TRIED religion?

Many men are all too prone to deride that which they do not know *from first-hand experience*

. . . when it is only from first-hand experiences that faith is developed

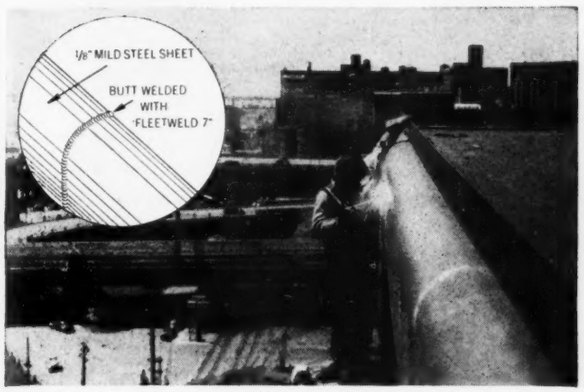
. . . and that goes for commercial faith as well.

"Outdated!" . . . he cries

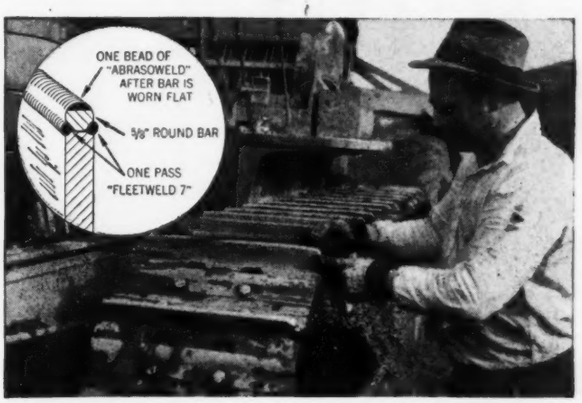
LOOK, VIDKUN, OUTDATING occurs only when men take recourse to

A BETTER WAY... ARC WELDING

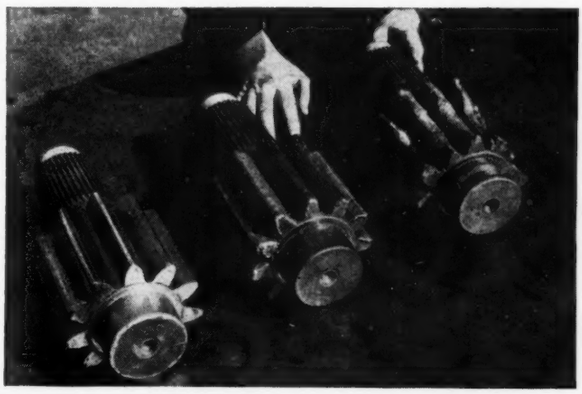
These Lincoln Electrodes simplify and improve hundreds of jobs in the construction industry:



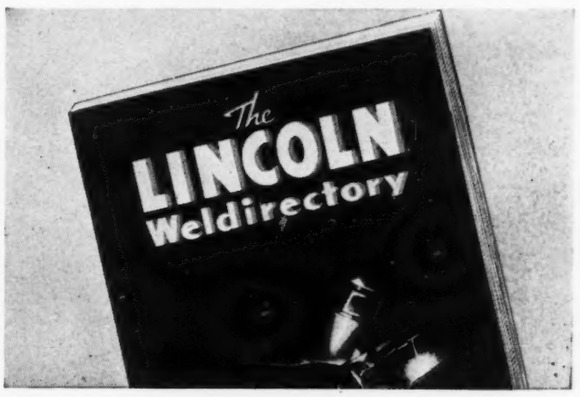
"FLEETWELD." World's most popular electrode for mild steel jobs such as the erection of this lift bridge. Speedy. High strength joints. In 7 types.



"ABRASOWELD" is applied to the top of tractor grouser bars to resist impact and abrasion. Treads are built up by welding on round bars as shown.



"TOOLWELD" provides the wearing qualities in the build-up of these tractor pinion teeth. Worn, as shown on right, they are built up with "Fleetweld" then given a layer of "Toolweld" with results as shown in center. Then ground as shown at left.



HOW-TO-DO-IT MANUAL, describing and giving procedures for 38 Lincoln Electrodes is available, free. Write on your letterhead, asking for "Weldirectory," Bul. 402.

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ARC WELDING

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FIGHTING ON EVERY FRONT

Material handling Crane.
Signal Corps Photo

Cable Bulldozer.

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Giant Truck Body with automatic downfold tailgate.
Telescopic Hydraulic Hoist.

Somewhere off in the far Pacific . . . on the hard fought battlefields of Europe . . . in Asia . . . Africa . . . anywhere, you name it . . . that's where Gar Wood equipment is serving Allied Forces in a hundred different ways. Famed Bulldozers with a colorful history, earth-moving Scrapers, tireless Winches, Wrecker Cranes, Hi-Lift Plane Loaders, Hydraulic Hoists, Dump Bodies, gasoline, oil and water Truck Tanks . . . these and many others are the wartime products of Gar Wood. Each of the six divisions of Gar Wood Industries, Inc. specializes in its field, and each division is busy producing the fighting equipment it knows best how to build.

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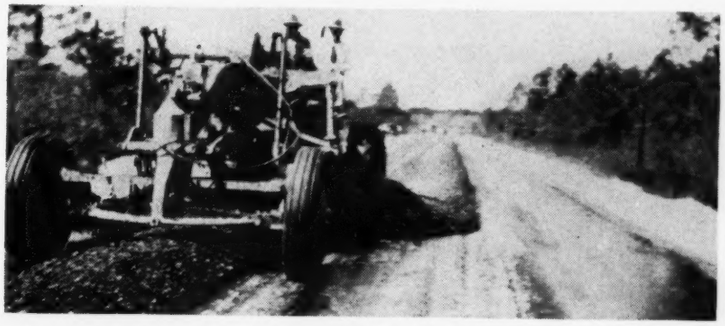
Stage Construction with Asphalt

spreads Road Building costs over the years

1 In the beginning, surface-treatments with Texaco Asphaltic products at intervals of one or more years provide a satisfactory road surface.



2 When required by increased traffic, a low-cost Texaco pavement of the road-mix or plant-mix type may be placed on the existing road.

3 Eventually, a heavy-duty Texaco pavement of the Sheet Asphalt or Asphaltic Concrete type may be constructed without disturbing the old road.

It is sound road building practice to improve roads and streets by stages, as dictated by the needs of increasing traffic. This desirable policy is readily effected through the use of Texaco Asphaltic products.

Starting out with an adequate, well-drained macadam or gravel base, surface-treatments with Texaco Surfacing Material at intervals of one or more years provide satisfactory service while traffic is light. When a higher type surface becomes necessary, add to the existing road a low-cost pavement of the road-mix or plant-mix type, using the recommended grade of Texaco Surfacing Material and inexpensive local aggregate. Eventually, when traffic demands a heavy-duty pavement, a durable Texaco Sheet Asphalt or Texaco Asphaltic Concrete wearing surface may be constructed, without disturbing the old road.

By employing the stage construction method, traffic is adequately served at all times. Each succeeding improvement becomes an integral part of the final pavement. The entire cost of the project is spread over many years.

Texaco Engineers, who are Asphalt specialists, will be glad to discuss with you the applicability of stage construction to your own roads or streets. Write our nearest office.

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Boston 16 Chicago 4 Denver 1 Houston 1 Jacksonville 2 Philadelphia 2 Richmond 19

TEXACO REG. T. M.

TEXACO ASPHALT

How a B-G Bucket Loader Can Save Money *the Year 'Round*

Truck loading time is cut to a minimum by the continuous operation of a Barber-Greene Bucket Loader. But more than that, the B-G Loader has year-round utility . . . can hustle along some construction or maintenance job each season.

★ The B-G Loader yields higher yardage, with less power, less weight, and less cost than any other method.

★ It can effectively handle a variety of loose materials—soil, sand, cinders, gravel or roadway debris.

★ Clean pick-up is assured with the follow-up scraper that cuts to grade and does light excavating.

★ Top performance in stockpile or semi-compacted natural deposit loading, light excavating, shoulder shaping or stripping to grade can be maintained with the 12 selective crowding speeds.

★ By substituting a B-G Snow Loader boom, the B-G Loader can be used for street snow removal.

Ask your B-G representative for details on the versatility and economy of B-G Bucket Loaders. Barber-Greene Company, Aurora, Illinois.

45-3

Barber-Greene B G *Constant Flow Equipment*

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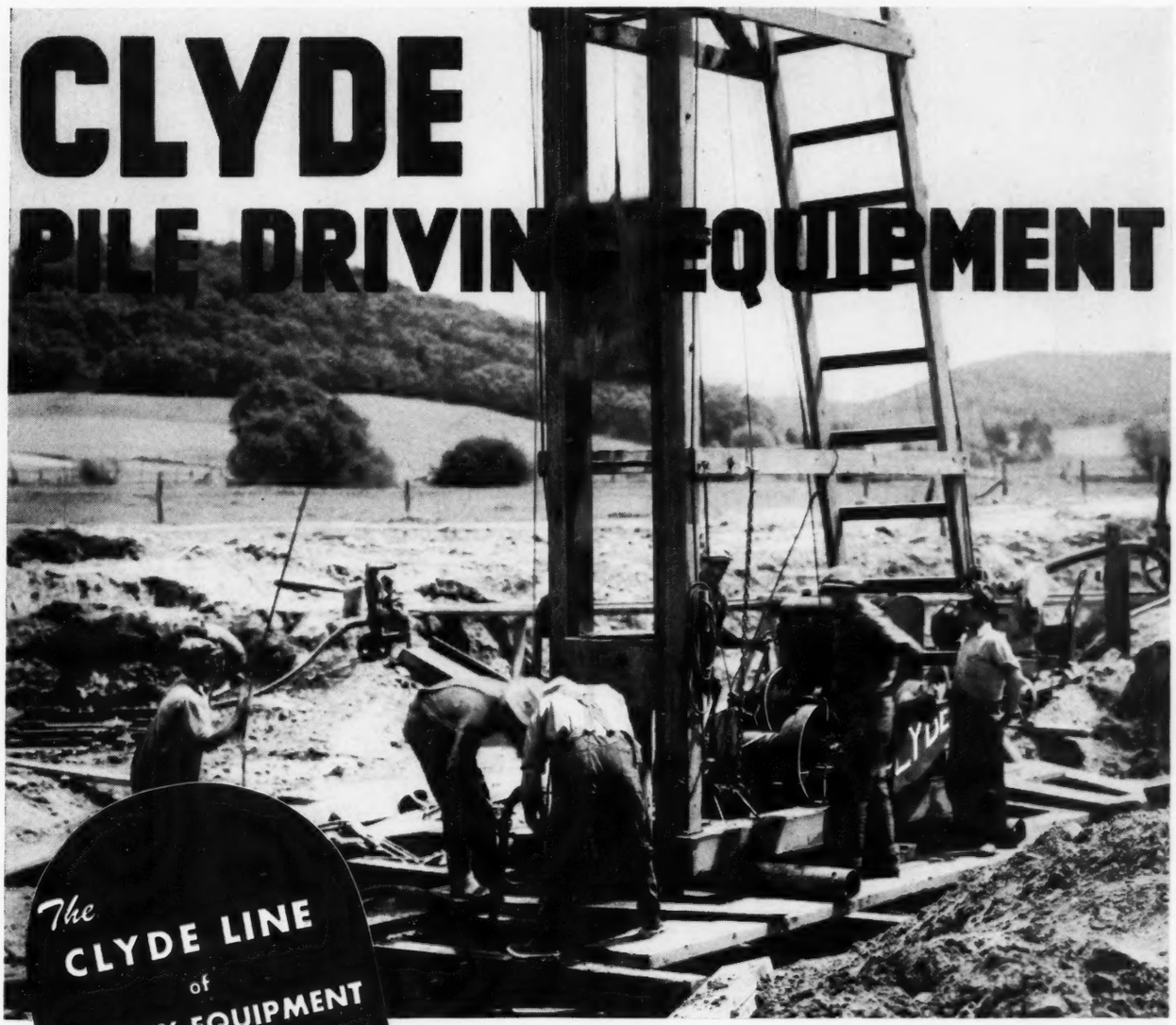
PILE DRIVING EQUIPMENT



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- PILE DRIVERS
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Clyde offers a complete line of heavy duty, dependable equipment for pile driving duty . . . gasoline, steam or electric hoists, leads, hammers and followers. Portable, self-contained units for fast and economical service are also available.

Whatever your construction material handling problems are, there are Clyde quality machines to save time and money for you. Write for bulletins on any type of equipment. Consult our staff of expert engineers . . . they specialize in serving you.

CLYDE

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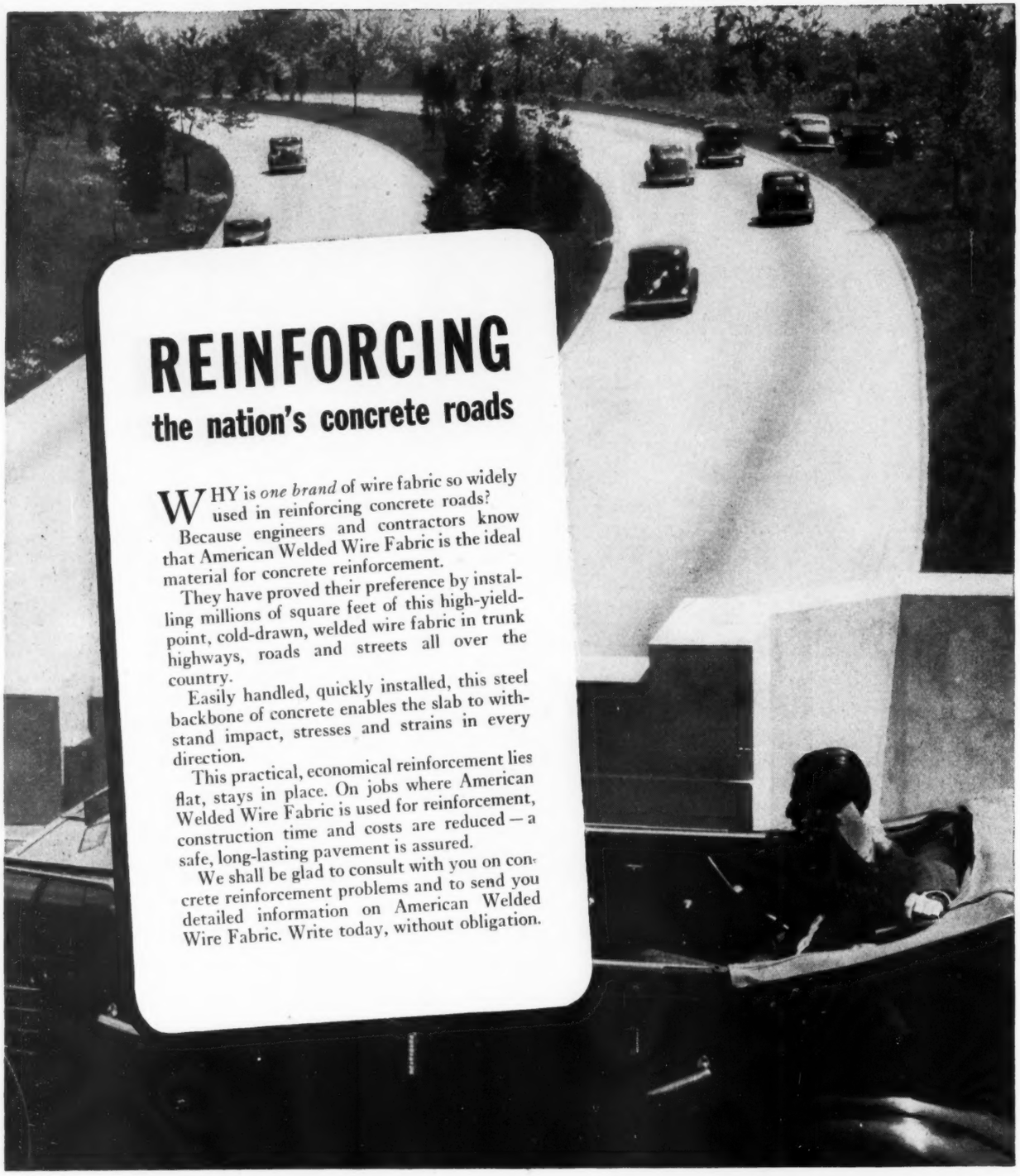

REINFORCING
the nation's concrete roads

WHY is *one brand* of wire fabric so widely used in reinforcing concrete roads?

Because engineers and contractors know that American Welded Wire Fabric is the ideal material for concrete reinforcement.

They have proved their preference by installing millions of square feet of this high-yield-point, cold-drawn, welded wire fabric in trunk highways, roads and streets all over the country.

Easily handled, quickly installed, this steel backbone of concrete enables the slab to withstand impact, stresses and strains in every direction.

This practical, economical reinforcement lies flat, stays in place. On jobs where American Welded Wire Fabric is used for reinforcement, construction time and costs are reduced — a safe, long-lasting pavement is assured.

We shall be glad to consult with you on concrete reinforcement problems and to send you detailed information on American Welded Wire Fabric. Write today, without obligation.

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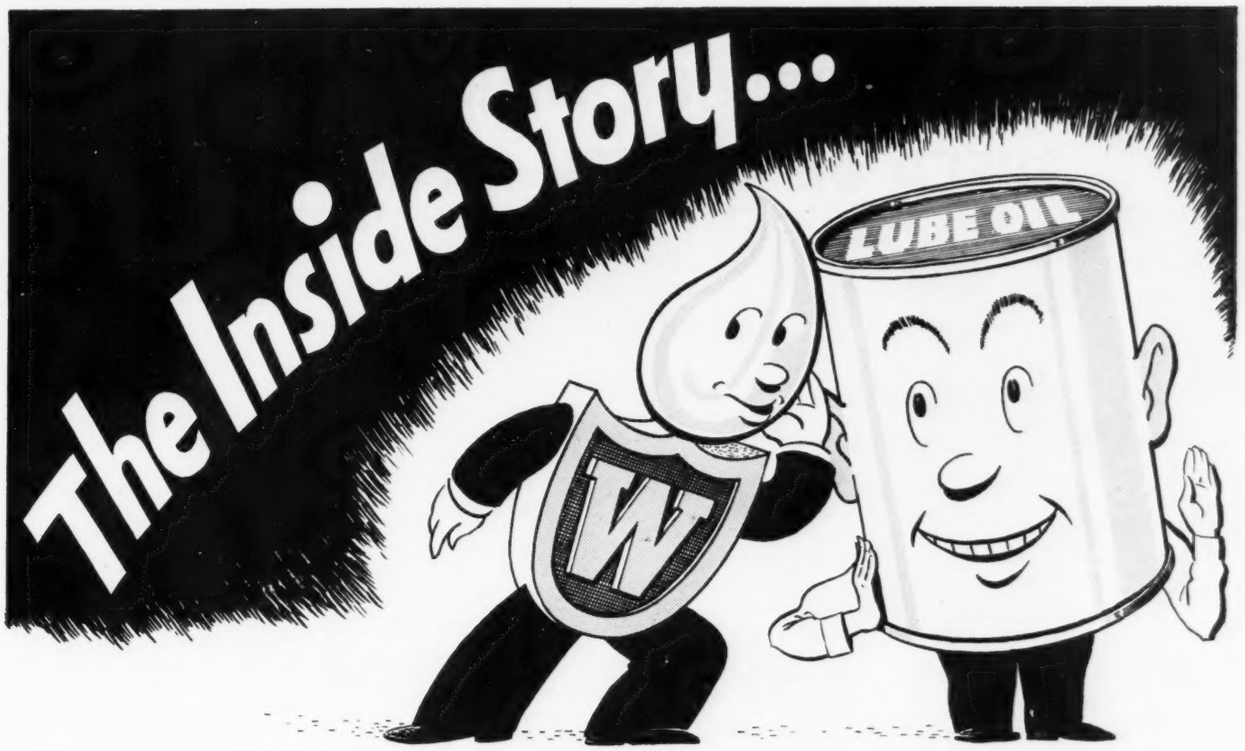
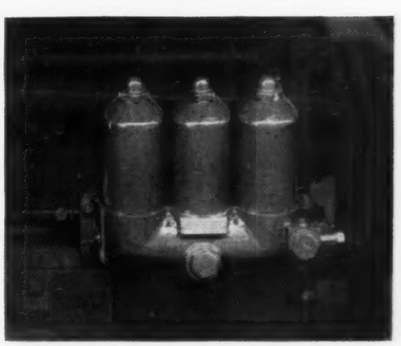


Clean oil is vital for efficient operation of those tough, rugged motors that power heavy construction machinery. Here's the *inside* story—for sustained efficiency the precision-machined parts of modern heavy-duty engines must be lubricated with *clean* oil—oil free of grit, acid and moisture. That's exactly the purpose for which Winslow Full-Flow *in line* Oil Conditioners and Winslow Free-Flo Replacement Elements were designed.

Winslow Replacement Elements—made in more than 130 different sizes to fit any standard make filter—embody exclusive, patented features. One of these features gives extra capacity to consistently pass and condition lube oil over a longer period of time . . . because the element *expands with use.* This means maximum porosity and oil cleaning ability long after ordinary filter elements become clogged.

In addition to the full line of lube oil Conditioners and Replacement Elements, Winslow also makes a wide range of fuel oil filters. Order from your jobber today.

PROOF IN USE



Winslow full-flow installation on Hall-Scott Model 400 heavy-duty truck motor.

For sustained efficiency the precision-machined parts of modern heavy-duty engines must be lubricated with *clean* oil—oil free of grit, acid and moisture. 23-C-3

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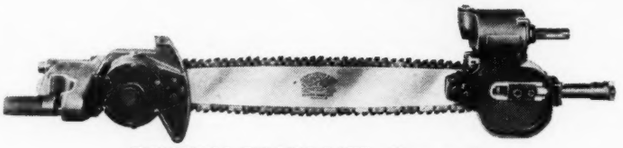
DISSTON CHAIN SAW with Mercury Gasoline Engine



DISSTON CHAIN SAW—Pneumatic

Construction engineers and contractors, in increasing numbers, are helping to overcome the handicap of manpower shortage through the use of this time-and-cost-cutting saw. On numerous operations it has been shown that a Disston Chain Saw enables one crew to equal the work of 20 men using cross-cut saws.

Disston Chain Saws are supplied in two types: with Mercury Gasoline Engine, and with pneumatic drive. They can be taken wherever a man can walk—moved from job to job as easily as any other tool. And they can be used on hardwoods and softwoods without changing chains.

Being made of the finest materials and with characteristic Disston thoroughness, the saws will stand up in service. They are light in weight, easy to handle, and require no previous experience to operate. And they are extremely flexible—can be operated for both horizontal and vertical cutting.

Disston Chain Saws are *available now*. Write for full particulars.

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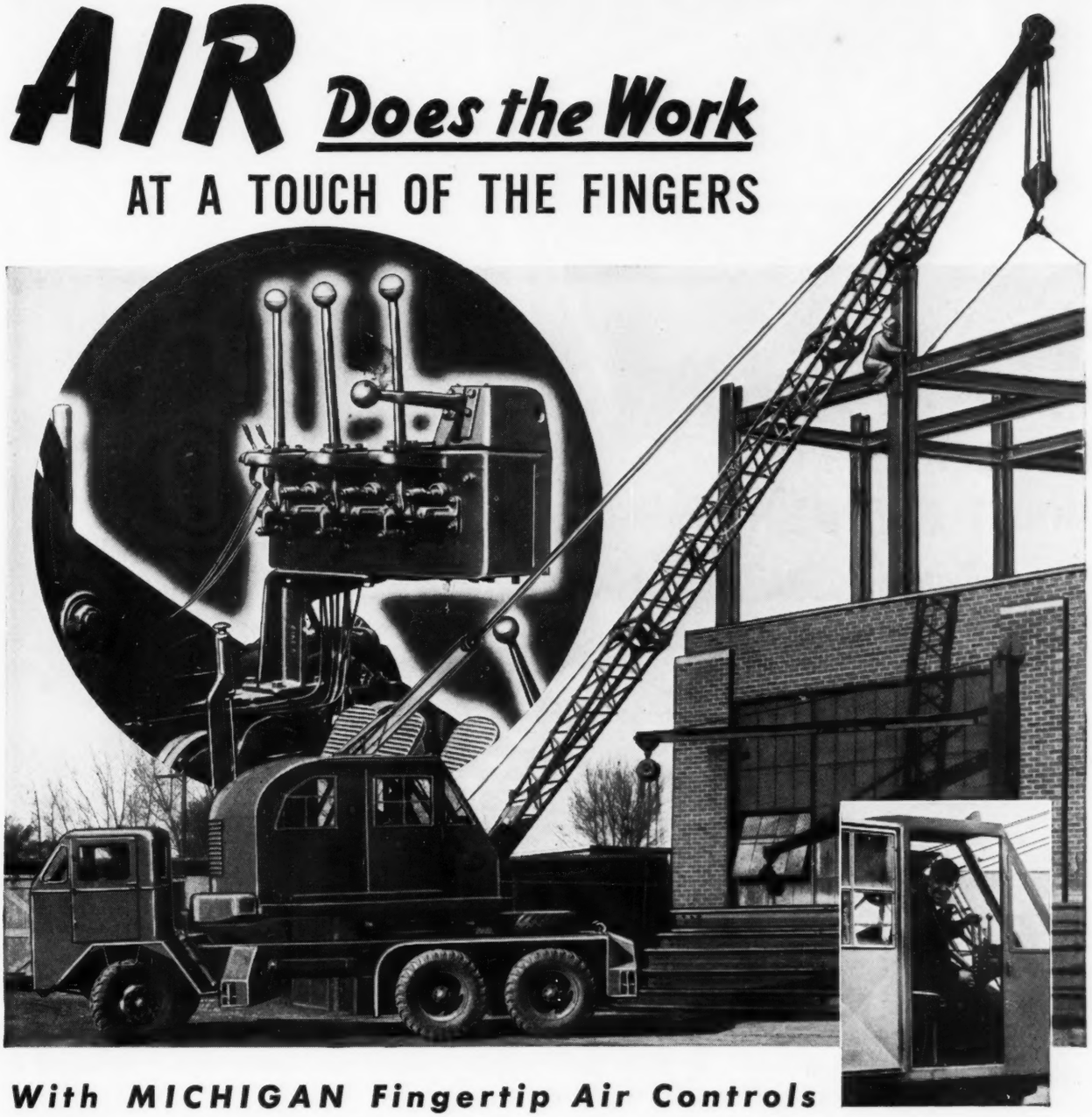
AIR Does the Work
AT A TOUCH OF THE FINGERS



With MICHIGAN Fingertip Air Controls

Hour after hour—in gravel, sand, clay or rock—operators of Michigan Mobile Shovel-Cranes maintain peak production with a minimum of fatigue. Michigan's Air Controlled Clutches are fast, smooth, positive. No cumbersome levers to push and tug, no rods, toggles or joints to become stiff with grease and dirt. Michigan's Air Controls are job-proven, both in civilian and in military use . . . . Unsurpassed operating speed and truck mobility, plus real stamina and balanced design, are combined in the shovel-crane that has proven "tops" in materials-handling.

3/8 yd. and 1/2 yd. shovels—convertible to crane, clam, dragline, trench hoe. 6, 10 and 12 ton cranes.

MICHIGAN
POWER SHOVEL COMPANY
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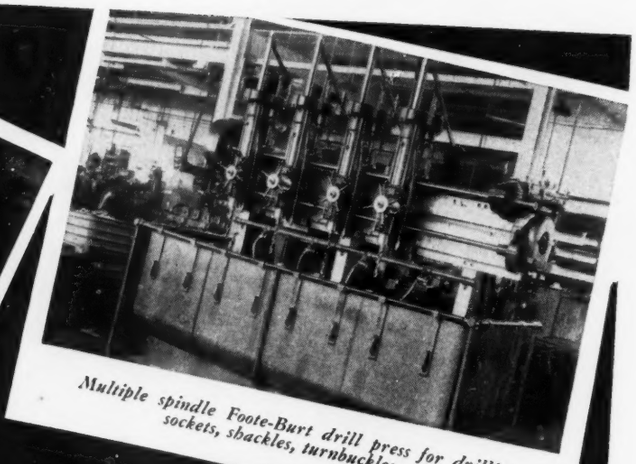
Landis bolt cutter—the very latest model; cuts threads on U-W turnbuckles.



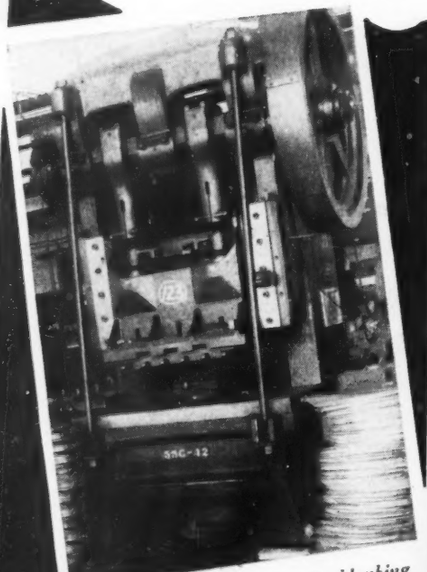
Multiple spindle Foote-Burt drill press for drilling sockets, shackles, turnbuckles.

THE NEWEST, FINEST EQUIPMENT...

Another reason Upson-Walton Products are Better Products

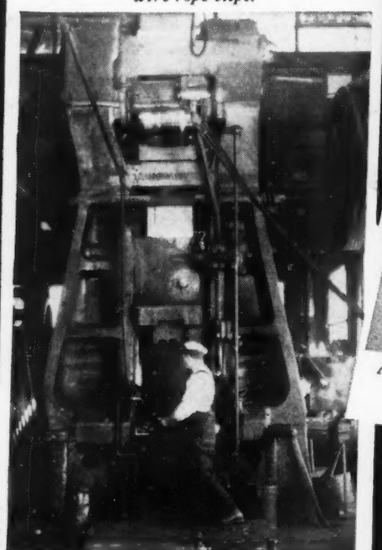
Illustrated are just a few of the machines—all of them the very finest and newest of their kind—used for making these U-W products:

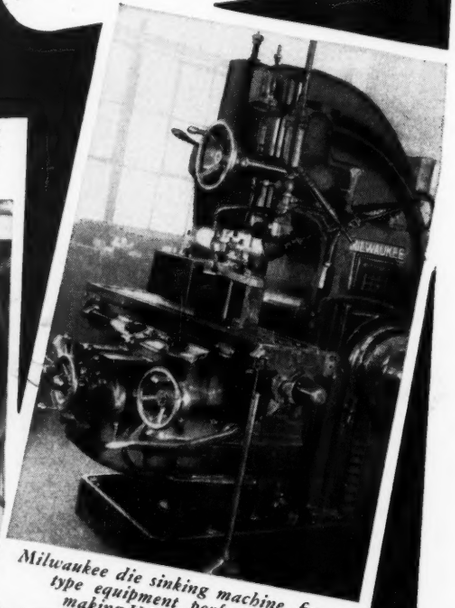
TACKLE BLOCKS • SOCKETS • EYE BOLTS
TURNBUCKLES • THIMBLES • SWIVELS
SHACKLES • HOOKS • WIRE ROPE CLIPS



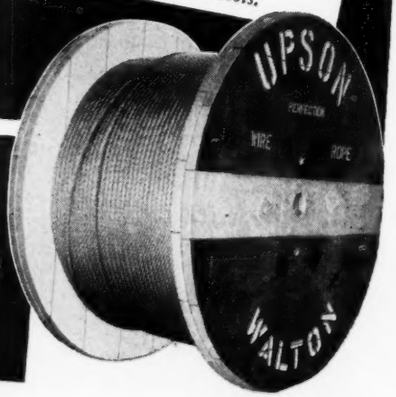
Latest design 200-ton press for blanking and forming tackle block parts.

4000-pound Chambersburg drop hammer —most up-to-date model—for forging hooks, turnbuckles, sockets, shackles, wire rope clips.





Milwaukee die sinking machine, finest type equipment perfected for making U-W dies and tools.



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Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

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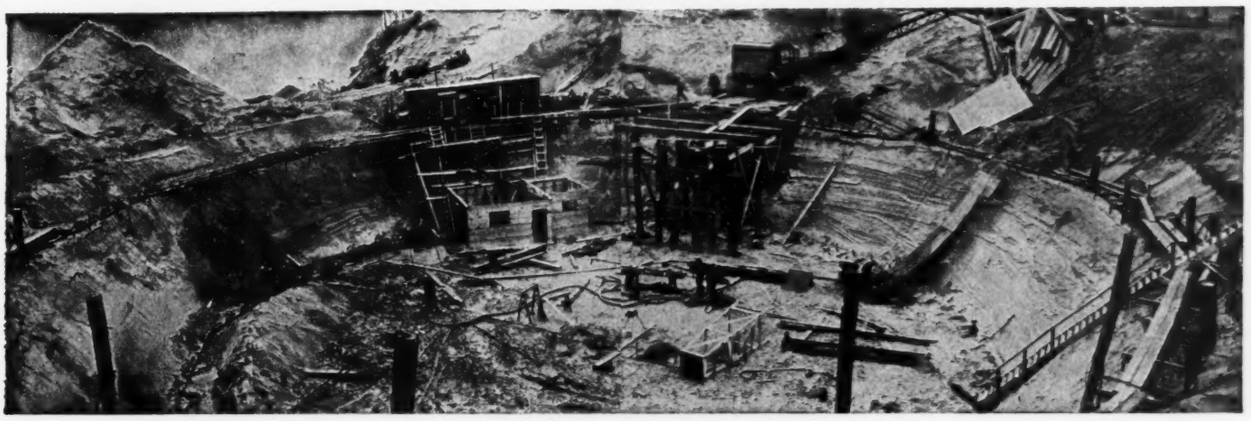
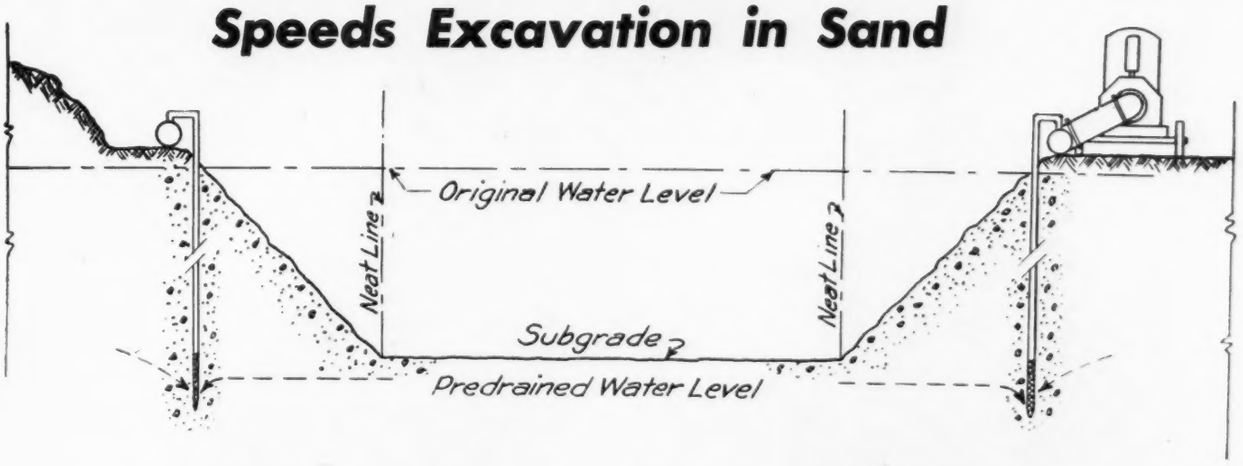
A Griffin Wellpoint Job!



Rapid Griffin Predraining Speeds Excavation in Sand



No sheeting needed on this job

This excavation for a municipal water supply was situated only a few yards from open harbor water. Sand was bulldozed across the dredged harbor to form a dike. The photo above shows the excavation 10 days after two Griffin Pumps started with Griffin Wellpoints at 4-foot intervals. Water level dropped 20 feet. Removal of water pressure allowed sand to repose naturally on a 1 to 1 slope; and excavation proceeded without delay. Dry YOUR next wet job for less — use GRIFFIN WELLPOINTS.

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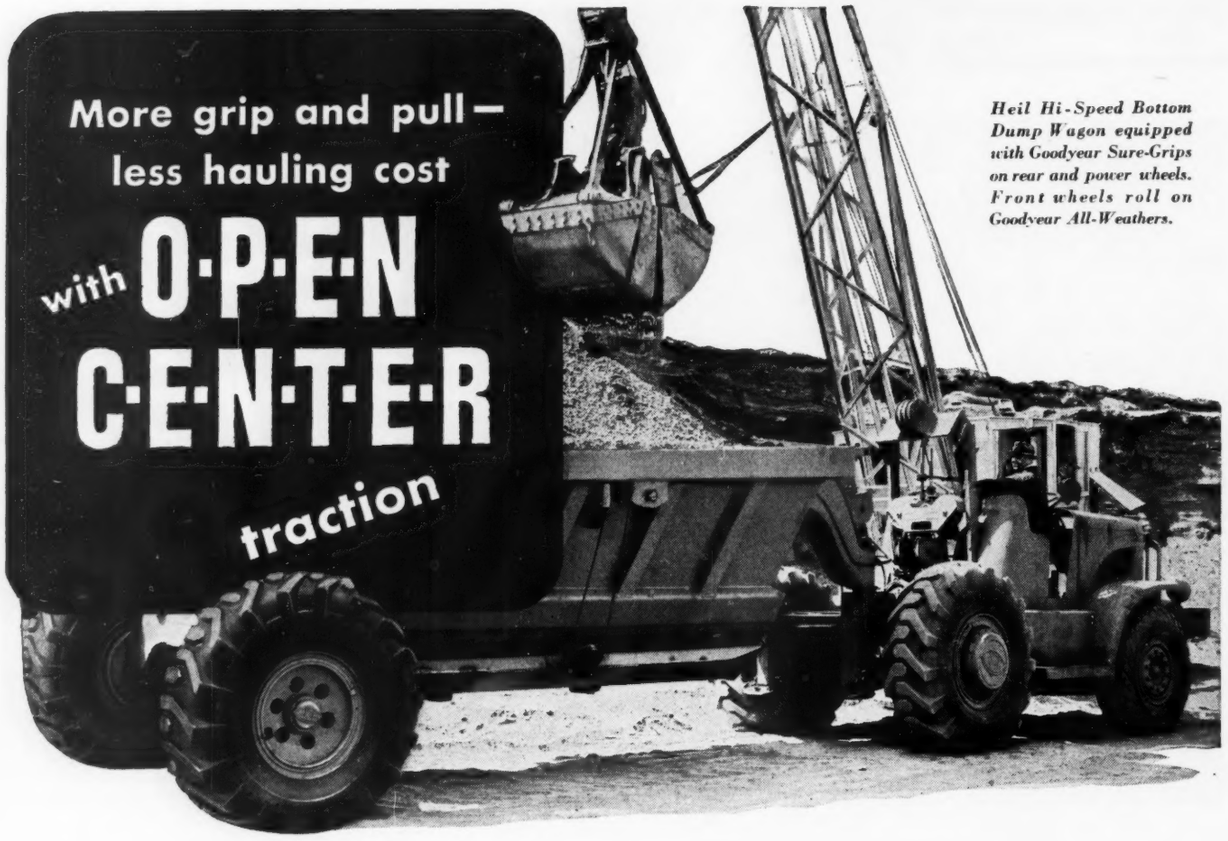
GRIFFIN WELLPOINT CORPORATION

More grip and pull— less hauling cost with O·P·E·N C·E·N·T·E·R traction



Heil Hi-Speed Bottom Dump Wagon equipped with Goodyear Sure-Grips on rear and power wheels. Front wheels roll on Goodyear All-Weathers.

SURE-FOOTED traction through any going — even on shifty soils like mud, clay and sand — is a must for keeping today's bigger yardages moving on schedule.

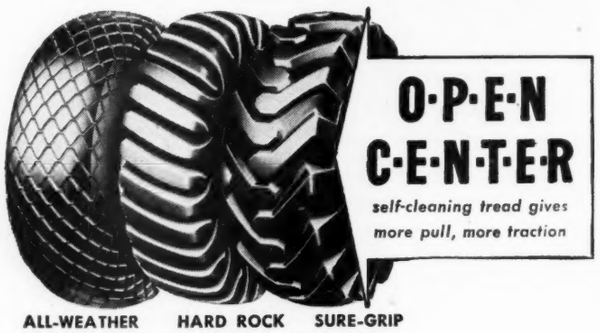
That's why more and more contractors now buy Goodyear Sure-Grips for their power wheels. They know that the time-proved *open center* tread of this great husky gets more grip and pull in any ground — pulls sure and steady under the heaviest loads — helps lower hauling costs.

Here's why: Those massive lug bars are unconnected at the center — open at *both* ends. So they dig in deeper, bite cleaner and sharper, provide steady, maximum traction under all conditions. And with no closed corners to clog up with mud, it's a *true* self-cleaning tread. Those wide, unblocked channels sluice out dirt, mud and stones, leave the sturdy lugs free and clear to bite deep and pull better every time.

Now superarmored with Goodyear's patented Rayotwist cord — *which makes the strongest body we've ever used in a work tire* — these really tough giants are the finest off-the-road tires that can be built from today's synthetic and permissible natural rubber.

Power your drive wheels with these Goodyears and you'll soon know why "more tons are hauled on Goodyear truck tires than on any other kind."

THE RIGHT TIRE FOR EVERY JOB



ALL-WEATHER EARTH-MOVER for drawn vehicles

HARD ROCK LUG for all rock work

SURE-GRIP for drive wheels

Sure-Grip, All-Weather, Rayotwist—T.M.'s The Goodyear T. & R. Co.

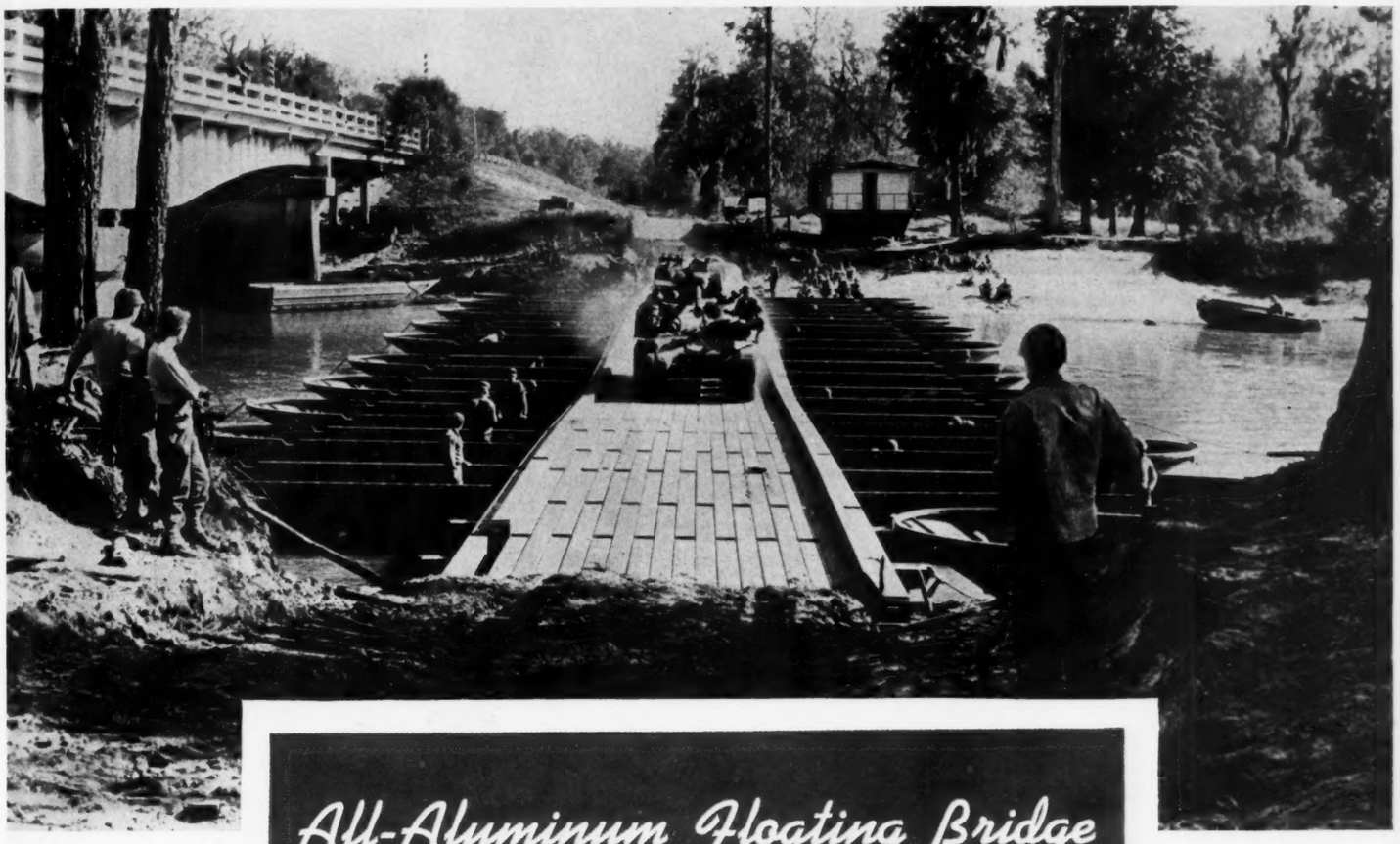
GOODYEAR

THE GREATEST NAME IN RUBBER

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 27 — MAY, 1945 — Number 5



ALL-ALUMINUM FLOATING BRIDGE is tested in United States before being sent overseas. Capable of carrying 50-ton vehicular load in swift current, it will be used primarily in attack.
U. S. Army Photo

All-Aluminum Floating Bridge

Developed for Use Overseas

A NEW ALL-ALUMINUM FLOATING BRIDGE is now being made available to Engineer units overseas. The 50-ton M-4 bridge was developed by the Corps of Engineers to handle the increasingly larger and heavier loads on military bridges. It is lighter, wider and capable of faster construction than any other ponton bridge now in use.

It consists of three main parts, each of aluminum: (1) hollow deck balk, (2) removable gunwales, and (3) half-pontons. Two half-pontons, each 30 ft. long and weighing only 1,700 lb., are locked stern to stern with connector pins to form a complete ponton which will safely support 26 tons. The bow of each half-ponton has been designed to an "ideal curve" to enable it to ride swift currents. Removable gunwales attached to each ponton provide a foundation for the deck balk of hollow aluminum.

Fixed in place with lugs and pins, this deck balk replaces both balk stringers and chess flooring in the older type wooden deck bridges. It is 15 ft. long, 9x9 in. in cross-section, and weighs 215 lb. It may be easily carried by four men, but will support a 300-lb. load afloat. Placed parallel to the flow of traffic, the balks are staggered to distribute the load and make the entire deck a continuous beam. The top surface is ribbed to minimize the skidding of vehicles. Disabled pontons may be unfastened from the deck with ease, towed out and replaced. The decking itself is so buoyant that if every ponton were sunk the deck alone could still support the full weight of a loaded truck.

Carried in 69 trucks and trailers, an M-4 bridge set provides about 436 ft. of floating bridge and 180 ft. of fixed bridge, or a total of 616 ft. Sixty-four 2½-ton trucks each carry equipment for 15 ft. of bridge, two 6-ton trucks with semi-trailers transport D-7 tractors, and three 4-ton trucks carry twin-screw power boats. Five Quickway cranes also

(*Continued on page 182*)

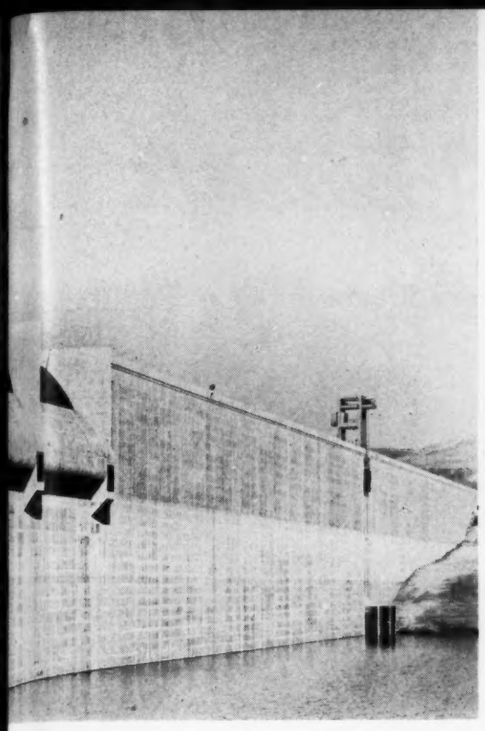
OPERATING AT IWO JIMA, bulldozers unloaded from landing craft build road through volcanic sand on beach. Many vehicles bogged down in sand before steel matting was laid. Tractor at left has armored cab.
U. S. Marine Corps Photo

JAPANESE PRISONERS unload sacks of cement at construction site in Mariana Islands of Pacific under supervision of American soldier.
Press Association Photo

THIS MONTH'S NEWS REEL

BONNET CARRE SPILLWAY GATES were opened by U. S. Army Engineers in March to lessen danger to New Orleans of flood waters from rising Mississippi. Here crane lifts timber wickets from spillway to open some of the gates. Released water flows into Lake Borgne. Completed in 1931, $13,000,000 spillway was operated once before, in 1937.
Wide World Photo

"FLOATING ROAD" through Great Dismal Swamp in North Carolina is being replaced by solid, modern road. Dredge at right pumps out muck, then pumps in sand from Pasquotank River to fill canal and provide stable foundation for swamp's first firm highway.
Wide World Photo



IXED WHEEL GATES at river and Madera Canal utlets of Friant Dam in California are lowered into osition by 80-ton crane.

U. S. Bureau of Reclamation Photo

NEW AQUEDUCT FOR MEXICO CITY is being rushed to completion to relieve water shortage. Project, costing $8,000,000, is being carried out mostly by hand labor. Pipe is of brick-lined masonry construction. It will carry water about 35 mi. across valleys and through mountains from springs near Toluca.

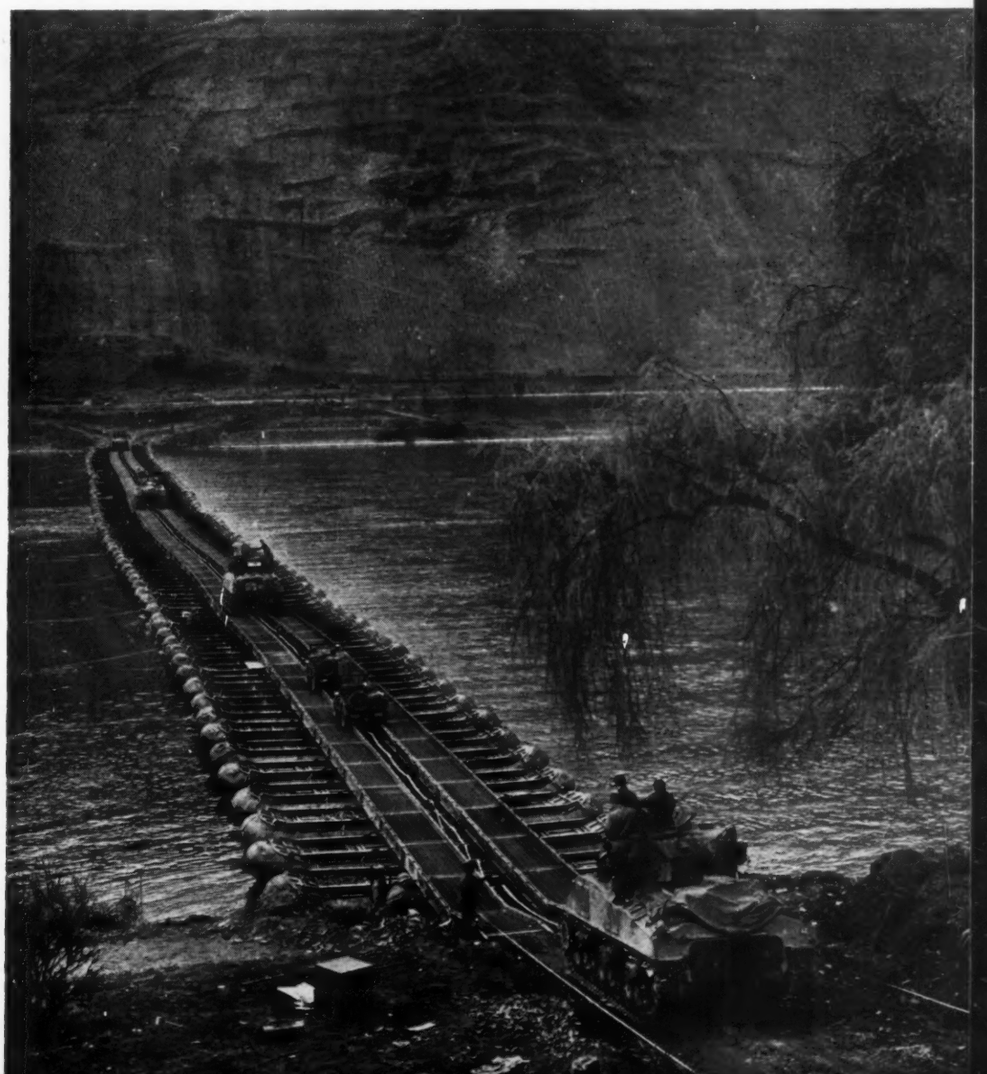
Wide World Photo

WO PONTON FLOATS (below) of air-inflated rubber are piled on top of Army truck for movement front in Germany for crossing of Roer River.

Acme Photo

CROSSING RHINE INTO GERMANY (below), jeeps and armor of U. S. Third Army roll over ponton bridge built by U. S. Engineers.

Signal Corps Photo



PRE-PLANNING OF METHODS PREVENTS Construction Accidents

Equipment Operating Procedure Should Be Recorded on Paper . . . Not Carried in Superintendent's Mind

By F. J. CRANDELL

Assistant Vice-President

Civil Engineering Division, Loss Prevention Department

Liberty Mutual Insurance Co., Boston, Mass.

LOSSES DUE TO ACCIDENTS on construction may be controlled and prevented by application of available knowledge of accident causes to a pre-design of the construction operation. To prevent an accident, possibility of its occurrence first must be foreseen. After work has started, basic changes in construction procedure are impractical. For efficient and profitable procedure, the man in charge of the job must make an advance analysis by actual recorded design of each operation before work begins.

To be effective, job working procedure must be tied into the design of construction operations. If everything, both men and equipment, stands still on a job, it is obvious that there is no opportunity for an accident. Movement, however, produces forces which, if uncontrolled, can produce an accident causing damage to equipment and structures and injury to workmen, with resultant slow-down and inefficiency. *Planning an operation mentally, without reducing the plans to paper, makes it virtually impossible to foresee uncontrolled forces.*

After an operation has started and the working procedure has been established, no amount of inspection and regulation can eliminate accident possibilities already in existence. If a contractor or a superintendent wants efficiency and minimum loss on a job, he must have means of studying movements within a job operation before the work begins. The following notes give several examples of pre-planning to improve efficiency and reduce possibilities of loss on job operations.

Mental Planning

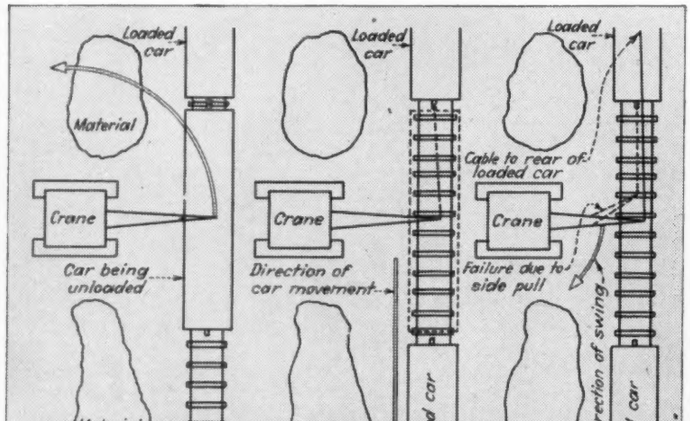
Methods design for too many jobs is about like this: The superintendent studies the contract plans and specifications, together with the equipment the contractor can make available to him, and determines in his own mind what methods he will use to complete the project most efficiently. He hires foremen in whom he has confidence and leaves to them the responsibility of working out their own methods for their parts of the job, after explaining to them the overall methods he has in mind. These men are probably all capable and all have in mind the methods their experience helps them to choose. The fallacy comes from the fact that no completely designed methods have been set down for all to see and understand; no particular relationship exists between the methods of any one man and the methods of the others, and the entire methods structure is mental and founded on variables not defined until there is conflict.

Good methods design for an operation depends fundamentally on answers to questions: (1) about equipment and temporary structures, and (2) about movement. Will the equipment and temporary structures be properly used? Are they adequate and safe for the work? With respect to movement, will it be free of interruption? Does it conform as nearly as possible to continuous flow?

It is extremely difficult to get correct answers to these questions from purely mental design of methods for a fair sized job. When the design is a composite in the minds of several people, it is a practical impossibility to coordinate details for proper consideration and thus arrive at fundamental standards.

The superintendent may say—and quite often does—"Hell, I know what my equipment can handle. My temporary structures are all right." But does he know?

A superintendent may be up against it to find information anywhere in a contractor's equipment yard indicating the safe working loads of the cranes to be used on his project, for example, or the boom angle, or radius, at which a certain load may be safely lifted. On many projects, the foremen, because they have



← **Fig. 1 . . . IMPROPER USE of crane boom involves sidewise pull which causes boom to buckle. After unloading one railroad car (Step 1), operator moves it out of way by attaching fall line to rear of car and swinging crane (Step 2), succeeding in this attempt because empty car offers slight resistance to rolling. When method is repeated to draw loaded car into position (Step 3), sidewise pull on boom results in buckling.**

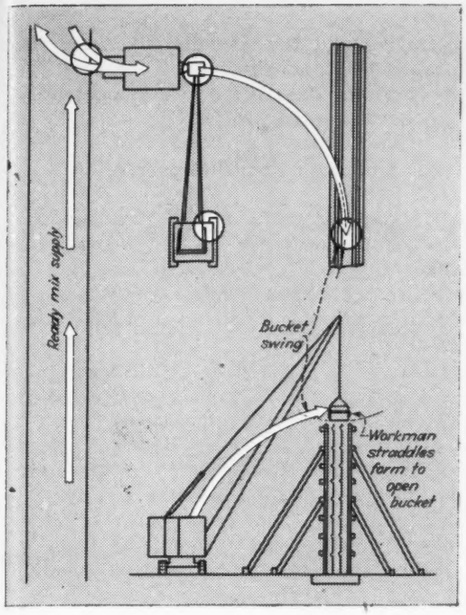


Fig. 2 . . . WITH THIS METHODS DESIGN for placing ready-mixed concrete by crane and bucket from truck mixer to wall forms, uncontrolled interferences between men and equipment occur at circled points. Because no provision is made to restrain it, bucket can cause danger by swinging in arcs indicated by broken lines. Man straddles form to open bucket.

not been informed, do not know the maximum loads to which they may safely subject the temporary structures.

Every day brings news of the collapse of some scaffold, ramp or other temporary structure, or of the breaking of a crane boom or other piece of equipment, which produces injury and even catastrophe and which causes interruption, delay and damage running into heavy financial loss for the contractor. These losses are the direct result of failure to provide specific and well designed methods. Such losses can be avoided, if the contractor will insist on carefully designed methods which are understood by all supervisory employees.

Crane Boom Buckles

An actual example illustrates how lack of information and understanding can cause damage to equipment. A crane with a 50-ft. lattice boom, spotted as shown in *Fig. 1* and confined by material and other equipment, unloaded a gondola and moved it out of the way by attaching the fall line to the empty car and swinging the crane. To spot the next car, loaded with 15 to 20 tons of steel, the operator attempted to repeat the process. The fall line was hooked to the far end of the loaded car, and, when power was applied to swing the crane, the boom buckled sidewise. Operations were stalled until the boom could be repaired.

How easily the loaded car could have been moved had the method been properly considered and designed. A crane boom is made to lift heavy loads vertically—not to withstand severe side pulls. By reeving the fall line through a snatch block attached to a deadman under the tip of the boom, the load would be applied vertically on the crane boom and no failure would occur.

Design for Movement

As an example of methods design involving movement, let us consider the pouring of a high concrete wall in which ready-mix concrete will be delivered to a crane bucket for lifting by the crane to the forms. First, the design must eliminate interruptions as much as possible, and interruptions will occur where there is uncontrolled interference between (1) men and equipment, (2) men and men, and (3) equipment and equipment.

Ordinary mental design by a superintendent for this operation might be worked out about like this: "I have on the job a crane with a 50-ft. boom and a 1-yd. bottom-dump bucket. I will have the ready-mix company deliver the concrete into my crane bucket. The crane will swing the bucket above the forms, where the bucket will be opened to allow the concrete to run into the form. By repeating this operation and moving the crane a little, I'll get the job done."

A layout for this relatively simple problem is shown in *Fig. 2*. Analysis will reveal whether the methods design provides conditions which will allow movement to be as nearly continuous and as free from interruptions as possible.

For complete analysis, we must determine how the bucket is attached to the fall line. We find it attached by one shackle, without any tag line to keep the bucket from spinning and swinging. *Fig. 2* shows how the bucket-opening arm is operated by a workman straddling the form. The drawing also indicates the positions of the crane and transit mixer and shows the paths of movement of the equipment. Circles are drawn to inclose possible interference points which must be studied to assure that the method is as efficient as possible.

Fig. 3 presents a readjustment of method for this operation to overcome interferences in the original plan. Ready-mix concrete trucks are so routed that no backing will be necessary. If space is available, more than one truck can be in line to assure continuous operation of the crane.

Because the crane is controlled from the right-hand side, it is faced in the opposite direction, eliminating interference with the operator's vision while he places the bucket to receive concrete from the transit mixer. This improvement reduces the possibility of injuring a man between the crane bucket and the truck mixer.

To control the swing of the bucket, a tag line is added by attaching a block to the crane boom and reeving through this block a line tying the bucket to the second drum of the crane. This line gives positive control of the outswing of the

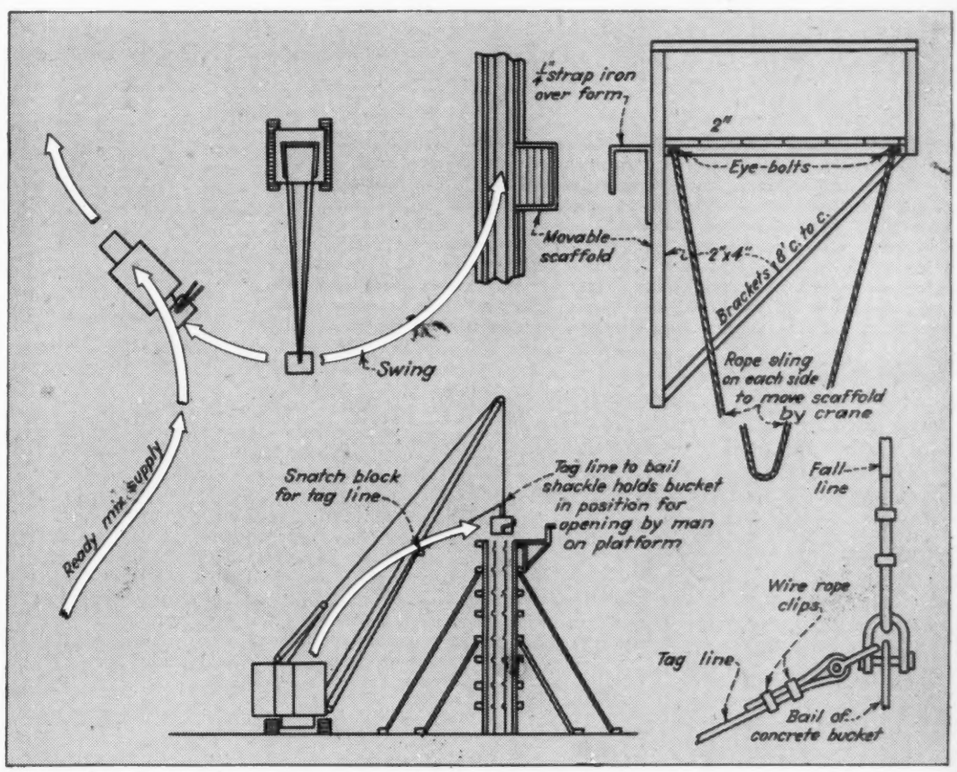

1" strap iron over form
2"
Eye-bolts
Movable scaffold
2"x4"
Brackets 8' C. to C.
Swing
Rope sling on each side to move scaffold by crane
Ready mix supply
Snatch block for tag line
Tag line to bail shackle holds bucket in position for opening by man on platform
Fall line
Wire rope clips
Tag line
Bail of concrete bucket

Fig. 3 . . . IMPROVED METHOD of placing ready-mixed concrete in wall forms reverses position of crane to provide unobstructed vision for operator when filling bucket and adds tag line both to restrain spinning and swinging and to control position of bail, thus putting bucket arm parallel with form and within reach of workman standing on detachable platform which can be moved by crane as concreting proceeds along wall. Redesigned method not only reduces accident possibilities but also increases output.

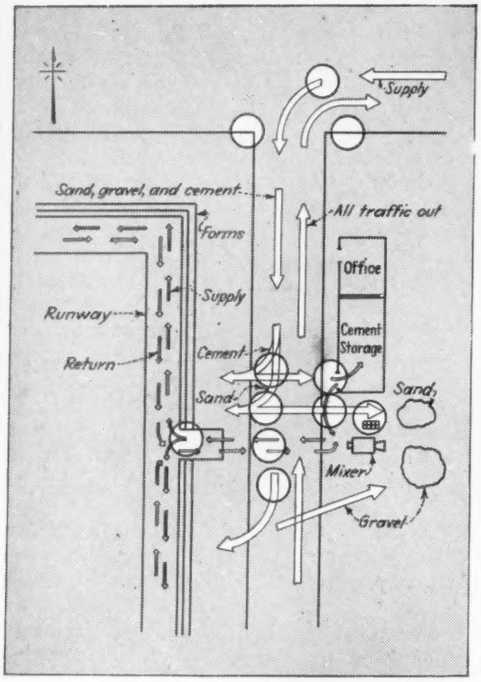


Fig. 4 . . . ILL-CONSIDERED LAYOUT for job which will mix its own concrete and place it in foundation wall forms from buggy runway causes numerous accident-breeding interferences, shown by circles, between (1) equipment and men, (2) men and men, and (3) equipment and equipment.

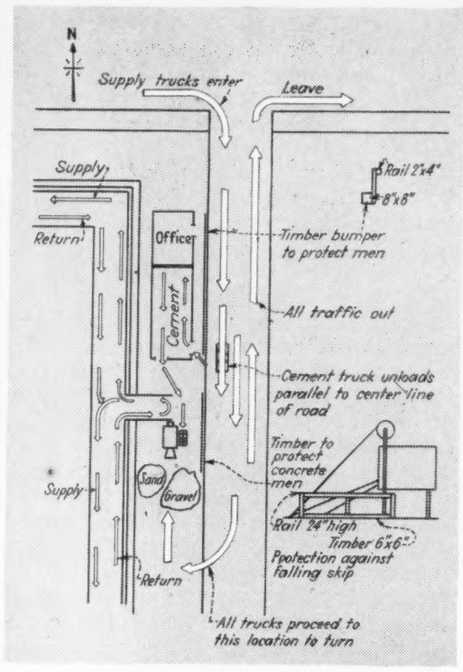


Fig. 5 . . . WITH INTERFERENCES SHARPLY REDUCED or completely eliminated by redesign of job methods, work can proceed at faster and more profitable pace, largely free from numerous interruptions invited by original ill-considered layout.

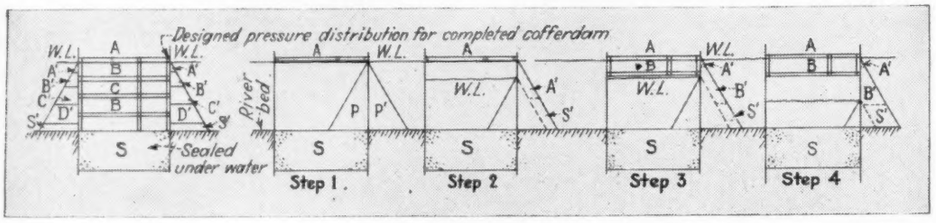


Fig. 6 . . . FAULTY PROCEDURE in unwatering steel sheetpile cofferdam to install successive sets of internal braces imposes excessive loads on steel sheets and timber braces, causing cofferdam collapse which results in death of one man and serious injury of ten others, in addition to loss of all work performed. With all braces, wales and posts in place, cofferdam would be structurally sound as designed, with pressures represented by area diagram being taken by appropriate sets of braces. During steps 1 to 4, dewatering of cofferdam to successively lower levels not only places disproportionate loads upon bracing set B but also leaves sheetpile walls unsupported for considerable depths, thus causing excessive stresses in steel sheets.

operation can be extended to cover the many operations of a more complex job to improve the efficiency and coordination of the entire project.

Concrete Foundation Walls

As another illustration, let us take the placing of concrete in foundation walls of a building on a job where concrete is mixed at the site. *Figs. 4 and 5* show the original and improved layout for this operation.

Fig. 4 indicates the superintendent's proposed operating layout. He plans to put his shanty and cement storage shed on the east side of an existing road which served as the driveway for a previous building, demolished to make way for the new building. The mixer also is to be placed on the east side of the road to shorten the haul for the men who move cement from the storage shed to the mixer.

Because concrete is to be mixed on the job, it is necessary to consider the flow of all trucking equipment delivering sand, gravel and cement. Flow lines on the drawing indicate procedures which the equipment must go through to deposit the materials at convenient locations for handling to the mixer. Smaller arrows indicate the flow lines that men and buggies must take to transport mixed concrete into the forms. Intersections of flow lines indicate points at which the

(*Continued on page 147*)

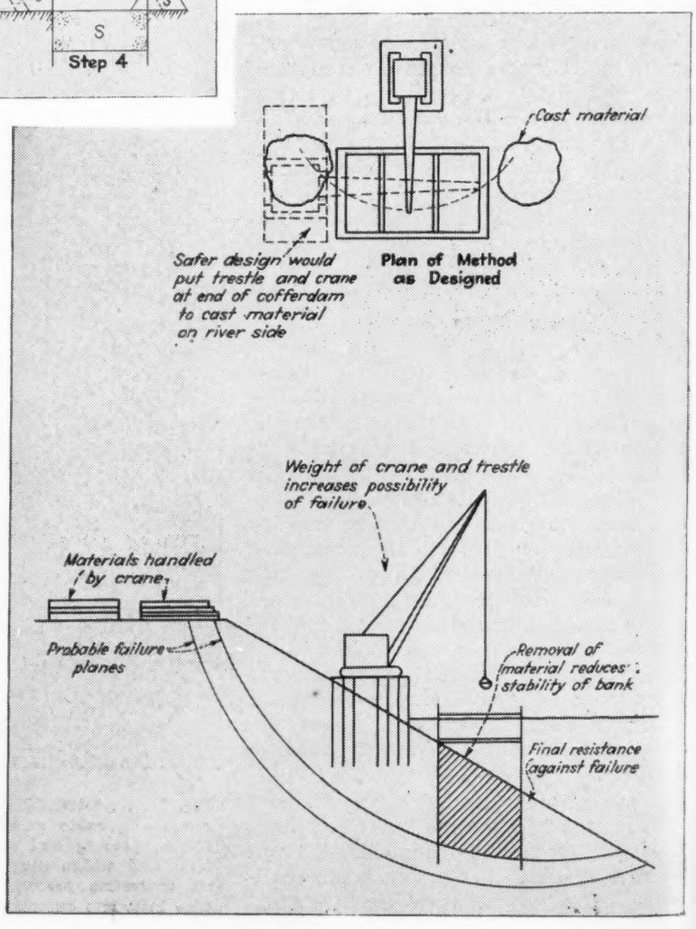

Cast material
Safer design would put trestle and crane at end of cofferdam to cast material on river side
Plan of Method as Designed
Weight of crane and trestle increases possibility of failure
Materials handled by crane
Probable failure planes
Removal of material reduces stability of bank
Final resistance against failure

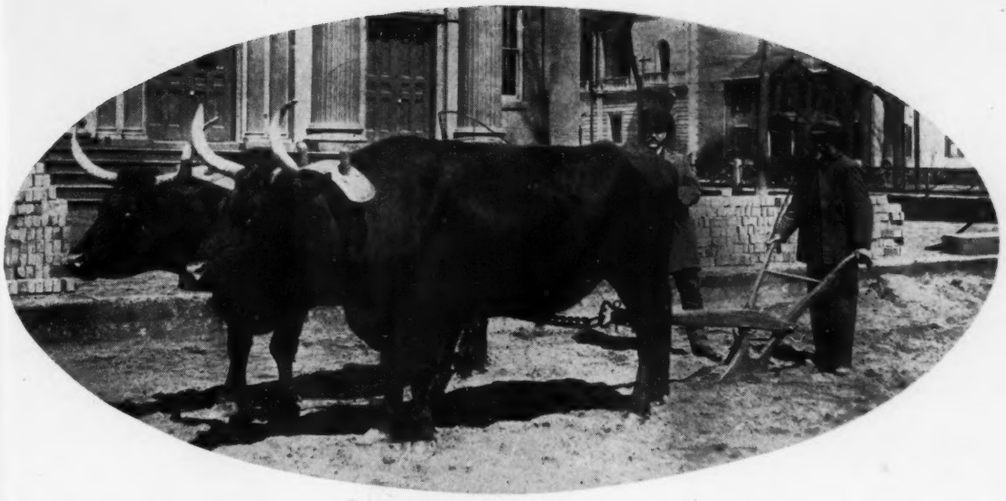
Fig. 7 . . . BY NEGLECTING TO CONSIDER reduction in stability of bank as material is excavated from cofferdam installed on 30-deg. slope, superintendent allows existing upper bank load, plus weight of trestle and crane, to build up pressure on land side of cofferdam, resulting in bank failure and disruption of structure, with loss of $16,000 to contractor. Improved construction layout shown by dotted lines in plan would eliminate equipment load on bank and would deposit excavated material on river side of cofferdam, where additional weight is needed to resist sliding.

bucket and allows the operator to revolve the crane more rapidly because he can restrain the bucket against the effect of centrifugal force.

By means of the tag line, the bucket is so turned that the opening arm can be operated from a platform at the side of the form. This change eliminates the necessity for a man to straddle the form while opening the bucket and thus removes a danger of possible interference between equipment and men. A platform which can be readily hung on the side of the form is shown.

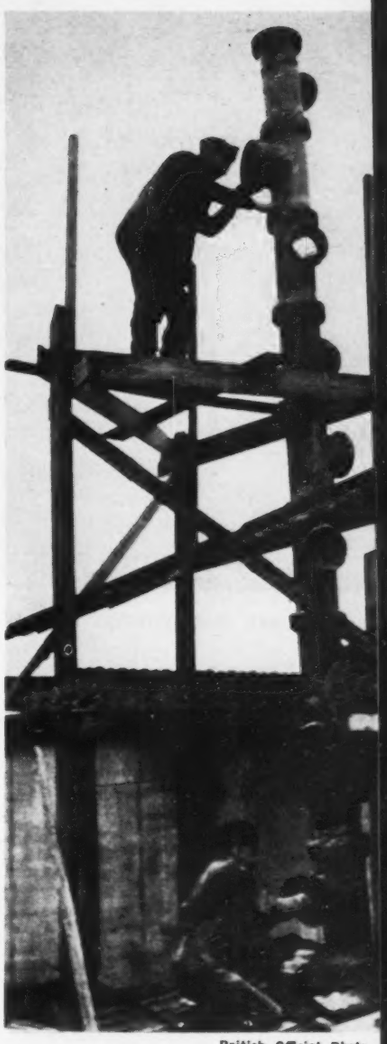
This simple case study indicates how planned methods design worked out to scale on paper can definitely facilitate operations and make them faster and safer. Operating costs and profits, as well as insurance cost, are favorably affected. The principles illustrated for one simple

JOB oddities



OLD-TIME METHODS of construction are recorded by C. W. Blakeslee & Sons, general contractors, of New Haven, Conn., in booklet published recently to commemorate 100th anniversary of establishment of company by Charles Wells Blakeslee in 1844. Here Blakeslee's oxen are plowing Temple St., New Haven, preparatory to hand excavation for paving contract in 1900.

DISCARDING DIGNITY for moment, U. S. Treasury Department uses cartoon to advertise sales by Machinery Division, Office of Surplus Property. This picture appears on cover of announcement of farm and construction machinery sales by office's Region 9 at Denver, Colo.



British Official Photo

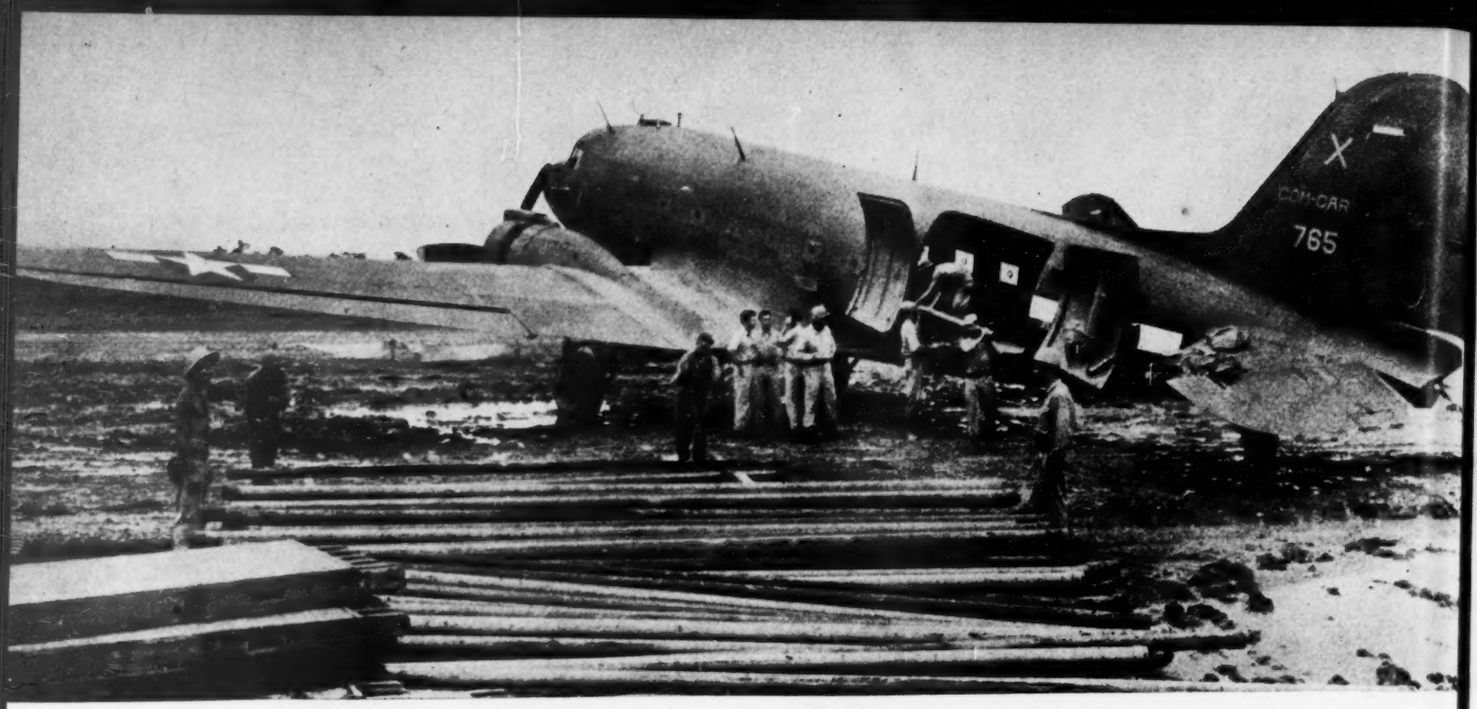
CHIMNEY for indoor heating plant at RAF airfield in Holland is made from sewer pipe left behind by Germans.

WALLS OF NORTH TUBE of Lincoln Tunnel (below) are washed before opening. Machine will be used for future washing, but work is here done by hand to protect coverings that have not yet been removed from niches for lights and other installations.

Photo, Port of New York Authority

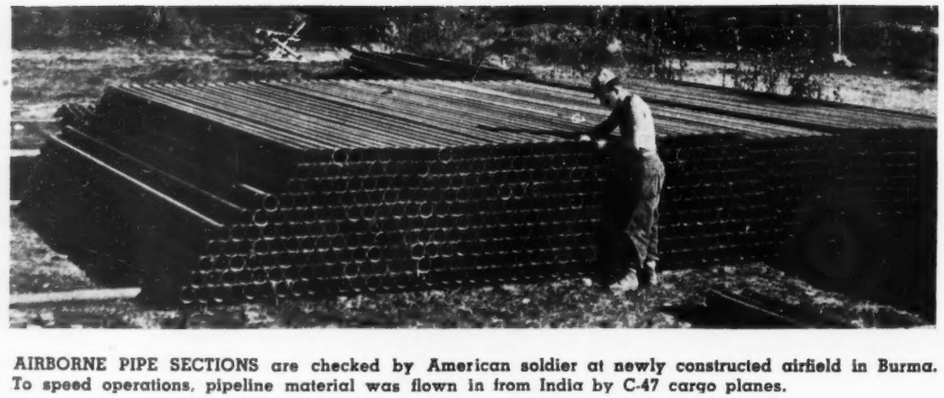
"BAMBOO INCH," 600-ft. pipeline of bamboo stalks (below), is constructed by U. S. Army Engineers in China to do work of ¾-in. pipe. Piths were rammed out of 15- to 20-ft. sections of bamboo and they were joined with connections made of short sections of pipe.

Reprinted from The Maintenance Engineer, War Plans Division, Corps of Engineers, U. S. Army



AIRBORNE PIPE SECTIONS are unloaded from C-47 at Myitkyina, Burma. Pipe was flown from India to airfield built by Aviation Engineers.

India-Burma-China Pipeline

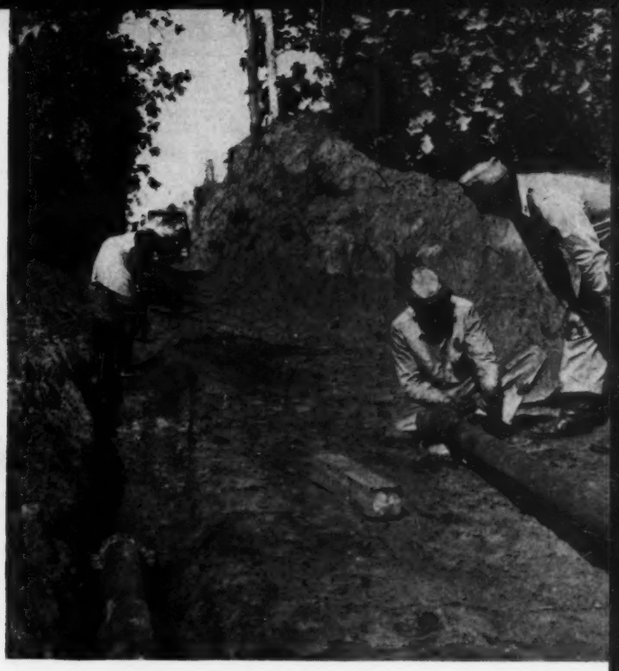


AIRBORNE PIPE SECTIONS are checked by American soldier at newly constructed airfield in Burma. To speed operations, pipeline material was flown in from India by C-47 cargo planes.

PETROLEUM PRODUCTS are now flowing into the North Burma-Assam combat area through the longest invasion-type pipeline ever built by military forces. Laid by U. S. Army Engineer troops, it was designed as a continuous system, starting with a tanker unloading terminal at Calcutta and extending 750 mi. to Tinsukia, in northern Assam. The pipeline follows the Brahmaputra Valley through Bengal and Assam and crosses the Patkai Range into northern Burma. When extended into China's Yunnan Province to its eastern terminus at Kunming, the 2000-mi. conduit will be the longest oil supply line in the world. It

ENGINEER-OPERATED FERRY (below) approaches bank of Mogaung River to pick up pipe sections for transportation across river

SECTION OF 4-IN. PIPE is carried through jungle 8 mi. south of Waraxup, Burma, by members of Engineer Petroleum Distribution Company.



NATIVE LABORERS work with American soldiers on installation of pipeline in Burma.

BUILT BY U. S. ARMY ENGINEERS

parallels the Ledo Road from Assam to its junction with the Burma Road and will follow the latter to Kunming.

Constructed of lightweight, 14-gage welded steel tubing of 4-in. and 6-in. O.D., the pipe was delivered in 20-ft. lengths. These averaged about 80 lb. per section for the smaller size, which was shipped inside the larger. The smaller pipe has a capacity of 200 bbl. per hour and the 6-in. carries 600 bbl. The sections were joined by a specially designed coupling, which consists of two bolts and a rubber gasket. Pumping stations, serviced by centrifugal or reciprocating gasoline-powered pumps, were installed at about 10-mi. intervals along the line.

Construction of the pipeline is a completely American job and was handled by the construction forces of the Services of Supply, Shina-Burma-India, headed by Brig. Gen. Thomas F. Farrell, former chief engineer of New York State. De-

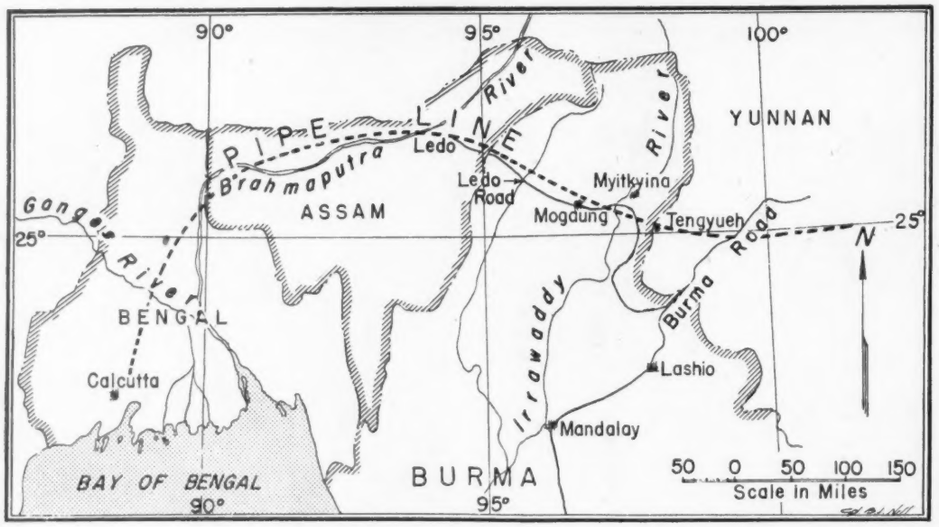
→

BRIG. GEN. THOMAS F. FARRELL was given testimonial dinner by New York Building Congress on his return to United States. Here he is greeted by CHARLES H. SELLS (left), superintendent of public works of New York State, where General Farrell formerly served.

REEL OF CABLE is unwound (left, below) and fastened to clamps of pipeline (right) in preparation for pulling across Irrawaddy River in Burma.

ONCRETE WEIGHTS are added to each joint preliminary to laying of pipe bottom of Irrawaddy River in order to keep line submerged when in place.

PIPELINE IS BURIED in ditch near Irrawaddy River. This portion of line is under water during monsoon season.



STARTING AT CALCUTTA, pipeline carries fuel through Bengal and Assam into north Burma. Final lap will extend it into China's Yunnan Province.

tails for the line were worked out by Lieut. Col. Arthur D. Small, chief, Petroleum Distribution Branch, Office of the Chief of Engineers.

Three-quarters of a million 20-ft. pipe sections were brought from the United States. American labor employed received 3 months of special training before going overseas. This labor was supplemented in the first stage by more than 7,000 coolies, supplied from tea-garden labor, and later by the Indian Pioneer Corps, 2,000 of whom were employed at one time.

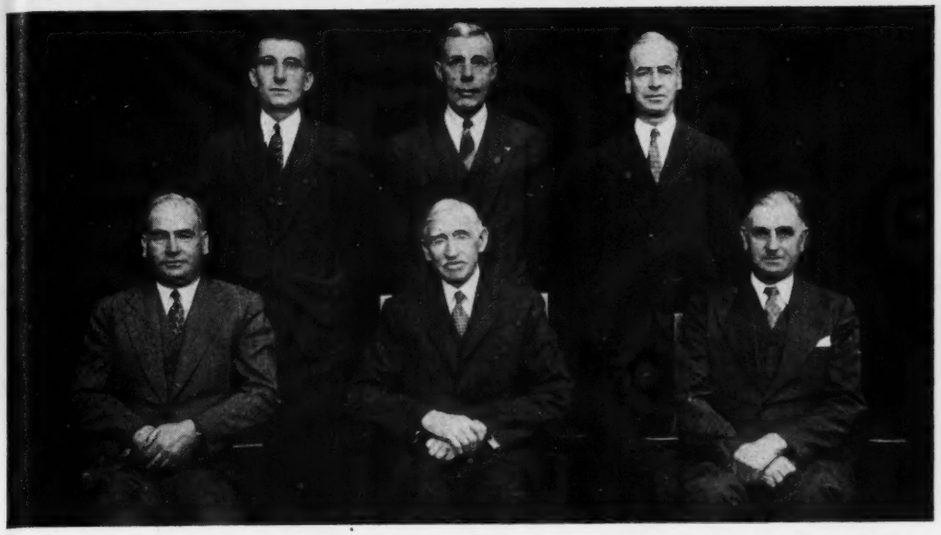
Although the line parallels the Ledo Road as closely as possible, the right-of-way often had to deviate because of the terrain. In some cases it was necessary to cut bulldozer traces down and around a mountainside in order to get pump equipment and pipe on the proposed site. In one instance a whole pump station was dismantled and portered piece by piece 4

(*Continued on page* 144)

WITH CHAIN TONGS (below) pipe is turned to facilitate arc-welding of joints at Irrawaddy River crossing, where line is weighted with concrete blocks.

BULLDOZER (below) makes cut in bank of Irrawaddy River through which pipeline will be pulled across river.

Present and Accounted For···A PAGE OF PERSONALITIES



ONE-HUNDREDTH ANNIVERSARY of establishment of its business in 1845 is celebrated by C. W. Blakeslee & Sons, general contractors, of New Haven, Conn. Organization founded by Charles Wells Blakeslee and carried on by three generations of family is now headed by executive officers here shown: (Seated, left to right) M. GRANT BLAKESLEE, president; CLARENCE BLAKESLEE, chairman of board; ALBERT D. BLAKESLEE, secretary. (Standing) FREDERICK J. SCHWICHTENBERG, assistant treasurer; WILLIAM T. GILBERT, vice-president; HAROLD L. BLAKESLEE, treasurer. Among notable projects completed by company during century of heavy construction are: 4-mi. cut-and-cover and tunnel section of New York City's Catskill Aqueduct (1912); 32-mi. section of Hartford-New London concrete highway (1920); Stevenson Dam on Housatonic River, Connecticut (1918); North Bradford water supply for New Haven Water Co. (1925).

DISTINGUISHED SERVICE MEDAL has been awarded to MAJOR GENERAL LUCIUS D. CLAY, former director of materiel, Army Service Forces, for his work in directing production and procurement programs for Army. He is now deputy to General Eisenhower and will have charge of civil affairs in Allied occupation of Germany.

Signal Corps Photo

FORMER PRESIDENT visits control room of Lincoln Tunnel (below), accompanied by officials of Port of New York Authority, on occasion of recent opening of north tube to traffic. Pictured (left to right) are: COMMISSIONER FRANK C. FERGUSON; JOHN C. EVANS, chief engineer; COMMISSIONER JOHN J. PULLEYN; AUSTIN J. TOBIN, executive director; HERBERT HOOVER; and BILLINGS WILSON, director of operations. In background is RAYMOND C. CRUTHERS, assistant superintendent, Lincoln Tunnel.

LEGION OF MERIT is presented to LIEUT. COL. LEO B. ROBERTS (right), Corps of Engineers, by MAJOR GENERAL EUGENE REYBOLD, Chief of Engineers, U. S. Army, for performance of outstanding services with Construction and Quartering Division and as head of Ports Sub-Section, Planning Section, Office of the Chief Engineer, European Theater of Operations.

WOMAN DREDGING CONTRACTOR IS MRS. MARGARET K. CARLAND, of Saginaw, Mich., who, on her husband's death in 1935, completed his contract for dredging Saginaw River for U. S. Engineers. Now head of her own dredging company and working on her third contract for War Department, she figures jobs and directs work in field.

400-FT. BRIDGE made up of 160-ft. center span and two 120-ft. side spans rests on rock-filled log cribs.

Prefabricated Timber Bridge

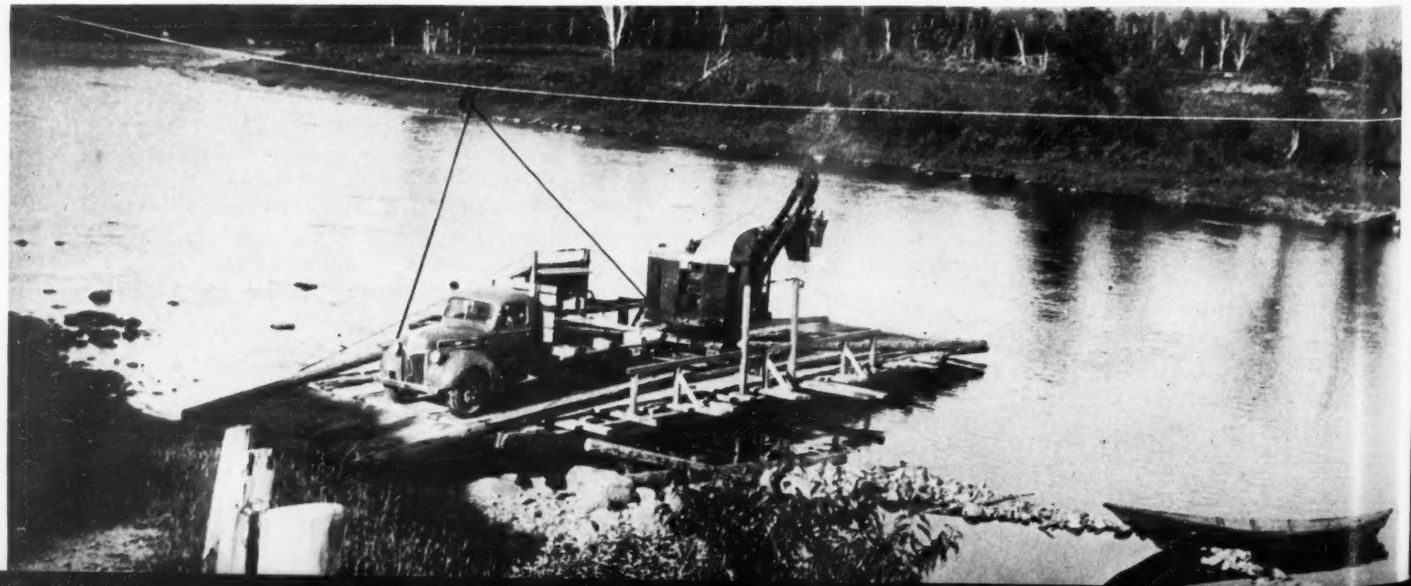
REPLACES MAINE FERRY

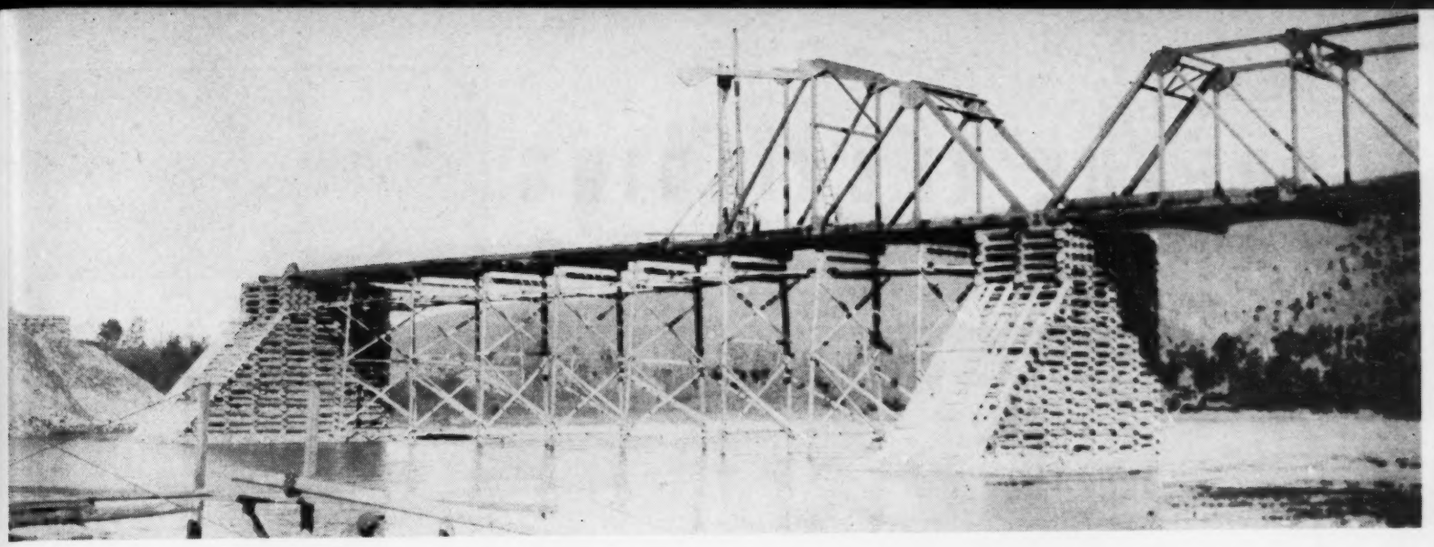
DESIGNED ORIGINALLY to make wartime use of local timber, a bridge comprising three truss spans of 400-ft. overall length, replacing a cable ferry across the Allagash River about ¼ mi. above its confluence with the St. John in the most northerly part of Maine, was built instead with a superstructure of prefabricated and treated Douglas fir when the latter proved cheaper than the final cost of the native product, shipped out for similar processing and returned to the site. En route to the job from the West Coast, fir timbers up to 12x14-in. size first were fabricated and assembled into framed units with Teco connectors by the Weyerhaeuser Timber Co., in accordance with plans by the Bridge Division of the Maine State Highway Commission, and then were disassembled for pressure treatment of the individual pieces with Wolman salts at the Port Newark, N. J. plant of the American Lumber & Treating Co. Delivered to the bridge location by 13-mi. truck haul from the nearest rail shipping point, the timbers were erected with the aid of a hand derrick by Walter V. Mitton, Inc., contractor, Augusta, Me., into the three truss spans, resting on rock-filled crib piers and gravel-filled abutments.

Carrying a roadway 14 ft. wide, the bridge is made up of a 160-ft. center span and two 120-ft. end spans. Top chords are 12x14-in. for the main span and 12x12 for the shorter spans; lower chords are respectively 12x12 and 10x12. Vertical distance between the chords is 30 ft. on the center span and 20 ft. on the side spans. A laminated roadway deck of 2x4's set on edge is supported by 6x14-in. stringers.

Each truss joint is framed with 5/16 in. steel gusset plates, about half of them cut from steel girders of an old bridge and the rest from new stock. Teco 4-in. shear plates were installed at timber-to-steel connections, and split rings (4-in. and 2½-in.) at timber-to-timber. Douglas fir for the superstructure

CABLE FERRY (below) takes power shovel across Allagash River to start substructure excavation for crib piers of timber bridge built by Maine State Highway Commission. By use of two guy connections to cable trolley, ferry is set at proper angle to be pushed by current from shore to shore.





FALSEWORK BENTS under floor beams support floor system over which hand derrick advances to complete erection of trusses and lateral bracing.

AFTER FABRICATION (right) and assembly into framed units as check on fit at connections, timbers are pressure-treated with Wolman salts and marked for erection in bridge.

amounted to 123,000 b. ft., steel plates totaled 22,000 lb., and hardware came to 32,000 lb., of which 12,000 lb. was for drift pins in the cribs, incorporating 65,000 b. ft. of cedar logs and 800 cu.yd. of rockfill.

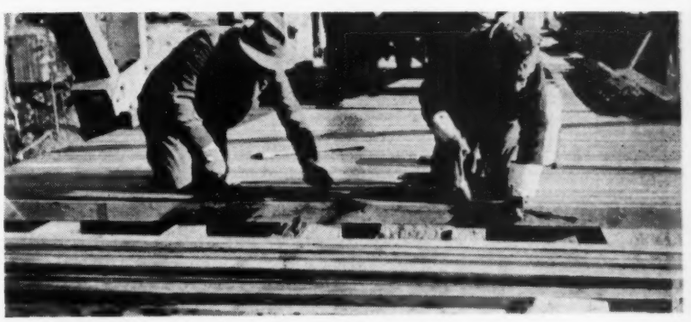
Substructure

About one-half of the cedar logs for the cribs came from the vicinity of the bridge, and the remainder were cut some 25 mi. up the St. John River. The latter logs were made up into rafts of about 100 each and were floated downstream to the head of some dangerous rapids, whence the logs were trucked 9 mi. to the bridge site.

At each pier location, the contractor first built an earth-and-gravel dike around the area and unwatered the cofferdam with

(*Continued on page* 180)

LAMINATED WOOD FLOORING (below) of 2x4-in. strips set on edge is spiked in place on 6x14-in. stringers.



ROLLER CONVEYOR (below) delivers timbers to erection derrick moving forward across bridge.

SKID DERRICK (right) equipped with two hand winches erects timbers in bridge superstructure.

CAREFUL REBUILDING

Modernize

WEDGE COURSE of cold-laid (Type F) bituminous concrete, tailgated from truck and spread with motor grader on left side of pavement, corrects excess crown of old road before 1½-in. plant-mix resurfacing is laid, as shown on right side of pavement.

By A. H. HINKLE
District Engineer, The Asphalt Institute, Cincinnati, Ohio

AFTER PROPER PREPARATIONS have been made in reconditioning the surface of an existing pavement and widening it, if required, overall resurfacing courses of asphaltic concrete are spread by a finishing machine riding on forms or are laid by a paving machine of the Adnun, Barber-Greene or Jaeger type. By virtue of their ability to lay pavement courses at low cost to a smooth riding surface as compared with former hand methods, these machines have revolutionized asphalt plant-mix construction.

Crown Correction—Where an excess crown prevails in an old road, truing up is best accomplished by a wedge course, laid to the edge of the base and feathered out near the center or quarter of the old pavement, as indicated by Fig. 5 of the accompanying drawing. By intelligent use of a modern paving machine, leveling old rough and irregular surfaces to produce satisfactory crown and smoothness on which to lay resurfacing courses is a comparatively simple matter. Sometimes the leveling and correction of the crown are accomplished by spreading Public Roads Administration Type F plant mix (workable when cold) with motor graders, as shown by one of the accompanying photographs.

Thickness of Resurfacing—Resurfacing performs several functions: Reduces expensive maintenance which would be necessary to preserve an old surface in good condition for traffic; provides a smooth-riding surface in place of one which was rough and irregular; increases the strength and carrying capacity of the pavement. The type of pavement being resurfaced and the subsoil conditions underneath it affect the thickness of resurfacing. The thickness should be governed by the condition of the old road and the loads it is to carry.

Particularly on rigid types of pavement it is not the best practice to apply comparatively thin resurfacing with a view to placing additional resurface a few years later. If thicker resurfacing is laid there will be less tendency for cracks and breaks in the old pavement to come through the new surface. Cracks are less likely to come through when two resurfacing courses are placed at about the same time.

Ordinarily, 2½ in. is the minimum total thickness of bituminous concrete which should be used in the resurfacing of old rigid pavements. Although a minimum thickness of 2 in. of bituminous concrete often will give years of service on an old rigid pavement which is properly patched and in fair condition, on a well drained base, a thickness of 3½ to 4½ in. may be required under heavy traffic on an old pavement which is comparatively weak or badly cracked. A thicker resurface of bituminous concrete better absorbs the shock of critical traffic and thus aids in preserving the resurface. To correct existing roughness on rigid types of pavement, resurfacing should be laid in more than one course, even though the total thickness is only 2 in.

TWO RESURFACING COURSES (below) of hot mix, each 1½ in. thick, are placed on old portland cement concrete slab after surface has been patched and primed with 0.1 gal. of emulsified asphalt. Traffic continues to use pavement while work is in progress.

Resurface on Brick

Base strength is not the only governing factor in deciding the thickness of resurfacing to be placed on old brick pavement. If the pavement is of the non-rigid type, consisting of brick with sand or bituminous filler, existing cracks will be less likely to work upward through the bituminous resurfacing than on a rigid

Pavements

FOR IMPROVED SERVICE AT MODERATE COST

IN TWO PARTS . . . Part 2

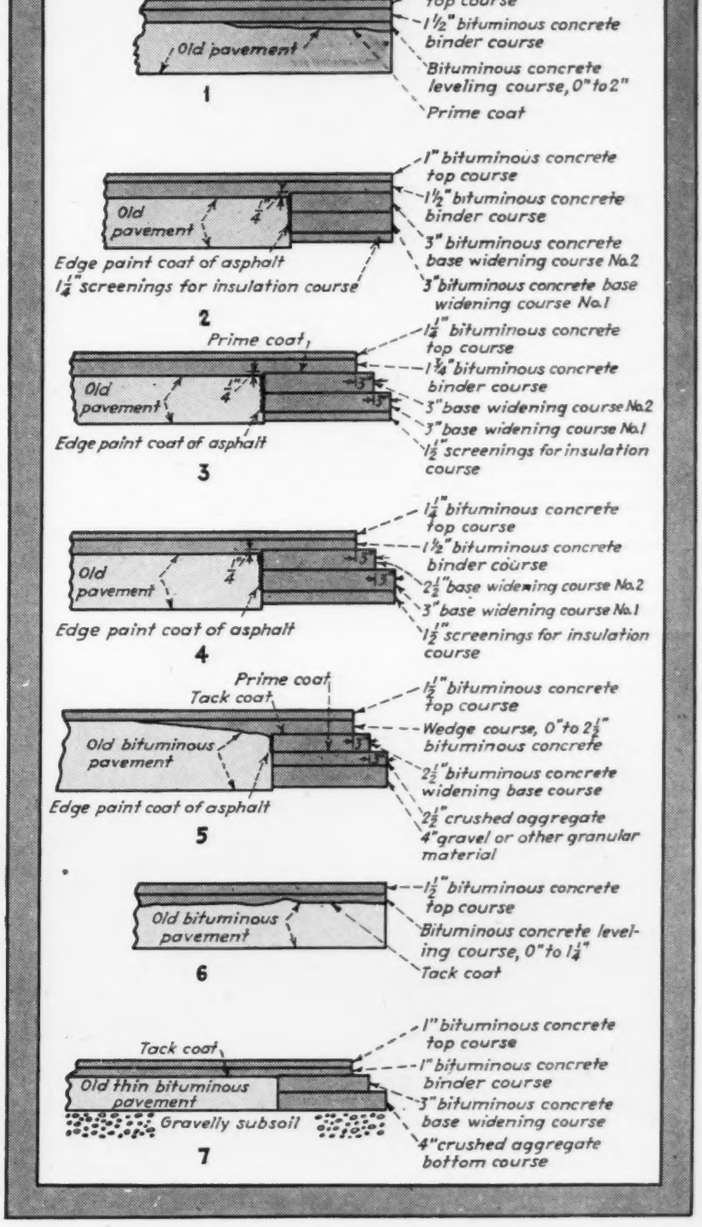
ON HIGH-SPEED TRACK at General Motors proving grounds, specially designed template spreads hand-shoveled asphaltic concrete mix on steep slope of superelevated curve. Rolling is performed by tandem roller which is aided up slope by winch attached to Caterpillar D8 tractor.

type where cracks are farther apart. Hence a slightly thinner resurfacing may prove satisfactory on brick with non-rigid filler than would be needed on a rigid pavement, provided the base strength is sufficient and the brick are tight and not working in the old pavement. To correct the roughness generally prevalent in old brick pavement of the non-rigid type, it is desirable on heavily traveled roads to use two resurfacing courses.

For correcting slight roughness and adding a reasonable amount of bearing strength to an old bituminous pavement, 1½ in. of bituminous concrete laid in a single course will frequently suffice. If any appreciable roughness prevails or if the old surface is cracked to any extent, it is desirable to lay

PREVENTIVE MAINTENANCE (below) applies 2 in. of bituminous concrete to 600-ft. stretch of old pavement to protect it against serious disintegration until general resurfacing can be undertaken.

SEVEN EXAMPLES of recommended design for widening and resurfacing of old pavement indicate features which have generally proved satisfactory for following conditions: (1) Old, very rough pavement resurfaced without widening; (2) widening constructed with steel side forms; (3) and (4) widening constructed without side forms; (5) wedge course used on old pavement widened without use of side forms; (6) leveling or "scratch" course used to true up old rough bituminous surface prior to placing 1½-in. over-all resurfacing course; (7) old thin bituminous pavement on granular subsoil widened and resurfaced with two thin courses to obtain necessary smoothness as well as increased bearing value.


1
Old pavement
1" bituminous concrete top course
1½" bituminous concrete binder course
Bituminous concrete leveling course, 0" to 2"
Prime coat
2
Old pavement
Edge paint coat of asphalt
¼" screenings for insulation course
1" bituminous concrete top course
1½" bituminous concrete binder course
3" bituminous concrete base widening course No.2
3" bituminous concrete base widening course No.1
3
Prime coat
Old pavement
Edge paint coat of asphalt
1¼" bituminous concrete top course
1¾" bituminous concrete binder course
3" base widening course No.2
3" base widening course No.1
½" screenings for insulation course
4
Old pavement
Edge paint coat of asphalt
1¼" bituminous concrete top course
1½" bituminous concrete binder course
2½" base widening course No.2
3" base widening course No.1
½" screenings for insulation course
5
Prime coat
Tack coat
Old bituminous pavement
Edge paint coat of asphalt
½" bituminous concrete top course
Wedge course, 0" to 2½" bituminous concrete
2½" bituminous concrete widening base course
2½" crushed aggregate
4" gravel or other granular material
6
Old bituminous pavement
1½" bituminous concrete top course
Bituminous concrete leveling course, 0" to 1¼"
Tack coat
7
Tack coat
Old thin bituminous pavement
Gravelly subsoil
1" bituminous concrete top course
1" bituminous concrete binder course
3" bituminous concrete base widening course
4" crushed aggregate bottom course

TRAFFIC USES ONE SIDE of pavement while bituminous paving machine lays course of asphaltic concrete on other lane.

BADLY DISINTEGRATED OLD PAVEMENT has passed beyond stage for greatest economy in resurfacing, but proper patching and resurfacing with 3 to 5 in. of bituminous concrete still can preserve existing slab and provide strong, smooth-riding pavement.

the resurfacing in two courses, each 1 in. or more in thickness, to produce smooth-riding qualities and prevent the cracks from coming through to the surface.

When greater base strength must be added, resurfacing courses should be placed to build up the necessary thickness. An extremely weak, old flexible pavement, indicated by an "alligatored" surface, may be converted by addition of 3 or 4 in. of plant mix into a roadway capable of carrying heavy truck traffic. It sometimes is less expensive to put an additional layer of bituminous concrete over a weak place in the road than to cut out the failed portion and patch it.

Estimating Thickness

Although modern formulas can be used to compute the total required thickness of resurfacing, knowledge of the condition of the old road and the traffic using it will provide the best guide to the thickness required. Experiments show that at low temperatures the bearing value of a hot-mix bituminous concrete beam varies approximately as the cube of the thickness. Since hot-mix resurfacing anneals to an old bituminous surface, the two thereafter acting together as a single course, the increased strength of a resurfaced road can be estimated with reasonable accuracy.

Although it may be stated in general that the minimum thicknesses of resurfacing should be 2½ in. on rigid type, 2 in. on flexible brick and 1½ in. on old bituminous pavements, these minimum thicknesses are not applicable in many cases. For example, in resurfacing old bituminous pavements which have satisfactory base strength and which are not cracked, and where only minor roughness is to be corrected or slightly disintegrated surface to be sealed, a resurfacing course as thin as 1 in. of plant mix may prove satisfactory on roads carrying only light traffic, using in the mix a comparatively soft asphalt cement, no harder than 85-100 penetration.

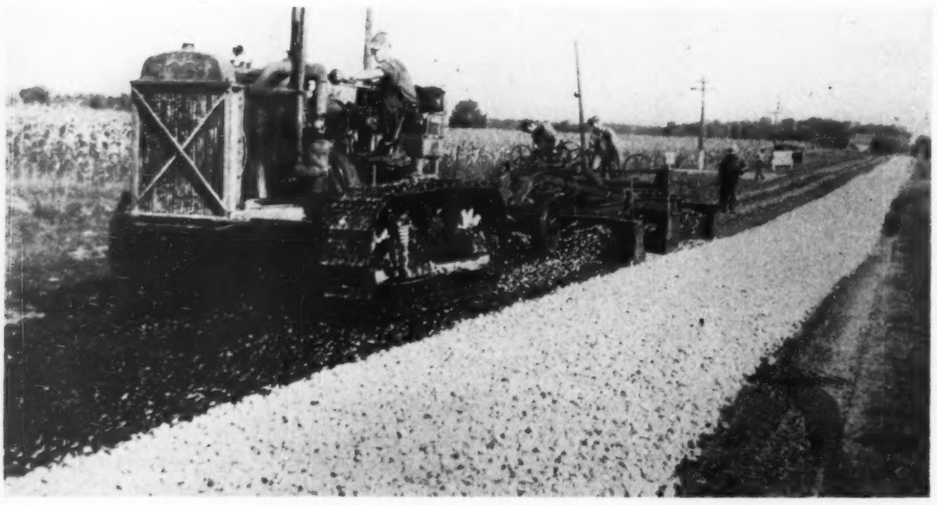
Resurfacing of Rigid Types

For rigid types of pavement resting on average soil foundations, thin resurfacing courses are not permanent, as cracks, breaks and roughness are soon reflected through them. They serve to smooth a rough surface temporarily until a heavier resurfacing can be placed. Surface treatments and thin road mixes serve this purpose as well as a thin plant mix, except for the greater interference with traffic during construction. In fact, a thin road mix may seal cracks better than a thin plant mix. For this reason, it is sometimes used as a first course in reconditioning very rough and badly cracked old pavement preparatory to resurfacing with plant mix. Such conditioning of old pavement may be well justified at times.

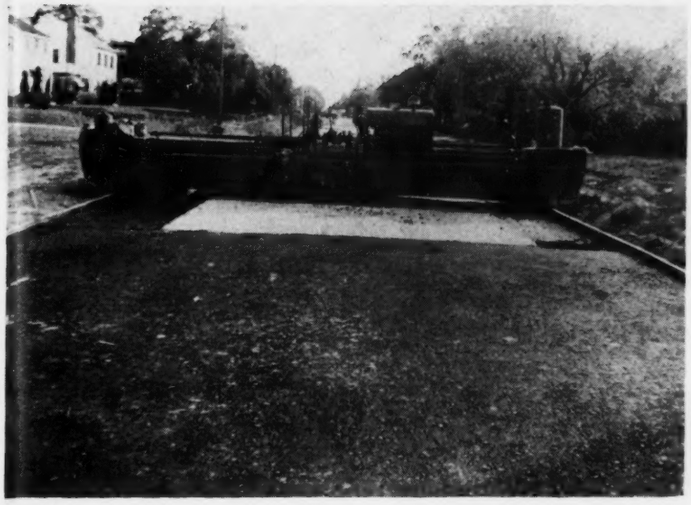
It should be emphasized that required thickness of resurfacing, particularly on rigid types of pavement, is a factor of the soil conditions under the old pavement. Gravel and sand foundation soils which drain well permit the use of a thinner resurfacing than a poorly drained plastic clay. Asphalt adheres tenaciously to a dry portland-cement concrete slab resting on gravel or sandy soil which provides such good drainage that moisture never works up through the openings in the concrete. If the old slab rests on a soil which is saturated much of the time, the bond of the asphalt to the concrete sooner or later is broken. Condition of the subsoil thus is a vital factor in determining the thickness of resurfacing to be used.

Stage Resurfacing

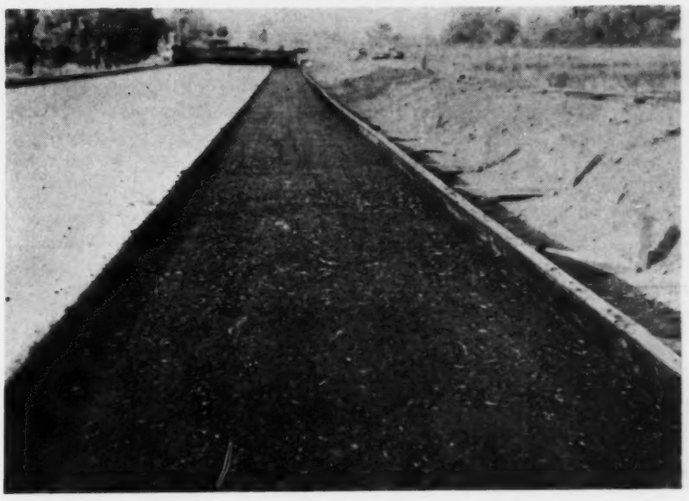
Primarily as a war measure, a course of asphaltic concrete 1½ to 2½ in. thick has been placed in some states over stretches of old portland-cement concrete pavement which were failing. These patch courses vary in length from 25 ft. to ½ mi. They were applied to protect



HEAVY ROAD MIX of open aggregate type, being processed in place by tractor-drawn multiple-blade mixing unit, will add great strength to old road.



FINISHING MACHINE, riding on steel forms at edges of road widened with bituminous concrete to 24 ft., lays first 1½-in. overall course of asphaltic concrete resurfacing, to be followed by 1¼-in. top course similarly applied.



TO IMPROVE LOCATION of center line of old road, entire added width is placed in single widening strip at one side of existing pavement.

pavements temporarily against rapid disintegration under heavy loads until overall resurfacing of the required thickness could be constructed. The patch courses, sometimes called "spot" resurfacing, will serve as a binder or base for general resurfacing when the latter is applied within the next year or so.

Although stage resurfacing is not particularly desirable, it does serve a temporary purpose in protecting weak places until they can be adequately resurfaced. Patch courses should be laid with a sufficiently dense mix to prevent raveling or, if an open mix is used, a seal coat should be applied.

Thickness of Courses

It is desirable that the final surface course be not less than 1 in. thick. To be able to roll the final surface course

(*Continued on page* 155)

WIDENED TO 24 FT. by 3-ft. width of bituminous concrete 6 in. deep, placed in two 3-in. courses at each edge of existing 18-ft. pavement, road is made ready for full-width resurfacing with 2½-in. bituminous concrete laid in two courses.

OLD BRICK PAVEMENT, not yet covered at right, is resurfaced with 2-in. hot-mix asphaltic concrete, already in place at left.

AFTER BEING PRIMED with 0.1 gal. per sq. yd. of emulsified asphalt, indicated at lower left, old concrete pavement is resurfaced with 2½ in. of hot asphaltic concrete, laid in two courses. First 1¼-in. course is in place in right foreground, and second course is discernible in distance on right. This project does not include any widening of old road.

British Engineers Build *Brick Runway* At R.A.F. Airfield in Holland

By FLIGHT LIEUT. JOHN BENTLEY
R.A.F. Official Observer on Western Front

SPITFIRE on snow-covered Dutch airfield is photographed through roll of landing strip wire.

BRICK PAVING, manufactured and laid by Dutch civilian labor, is the solution that has been applied by British Royal Engineers to the problem of hard-surfacing fighter airfield runways on marshy terrain in Holland. First of this type to be completed on Europe's mainland since D-Day was a 4,500-ft. long runway at a Royal Air Force fighter field. On the day this field was opened to operational traffic, a heavy bomber made a forced landing. As the big, heavy tires bounced on the wet brick surface of the runway, a fine spume shot up like spray from a destroyer's bows cleaving the ocean at high speed, but the runway held good. It had just taken without flinching the weight of something many times heavier than a Typhoon or a Spitfire. Subsidence of the marshy soil had been overcome and not a brick shifted.

The technical aspects and problems of modern, high-speed, winter airfield construction are numerous and particularly trying in view of the inherently soggy nature of Dutch soil. Here, the building of a permanent or semi-permanent

BRICKS ARE LAID (below) on runway of R.A.F. airfield in Holland by Dutch civilian workers under supervision of British Royal Engineers.

DUTCH BRICKLAYERS help repair dispersal point on forward airfield. These laborers had prewar experience in constructing and maintaining Holland's brick roads.

British Official Photos

R.A.F. airfield is a far cry from the Normandy days when bulldozers and portable wire tracking generally sufficed to produce a satisfactory emergency landing ground.

Three Types of Runway Construction

The British Army, capably assisted by the R.A.F. airfield construction wings, now concentrates on three main types of building work. The first two involve the laying down of completely new runways, together with perimeter and taxi tracks and ancillary buildings, upon strategically suitable sites. The third is the rehabilitation of unserviceable airfields abandoned by the Luftwaffe and either subjected to purposeful demolition or heavily bombed by the R.A.F. before occupation.

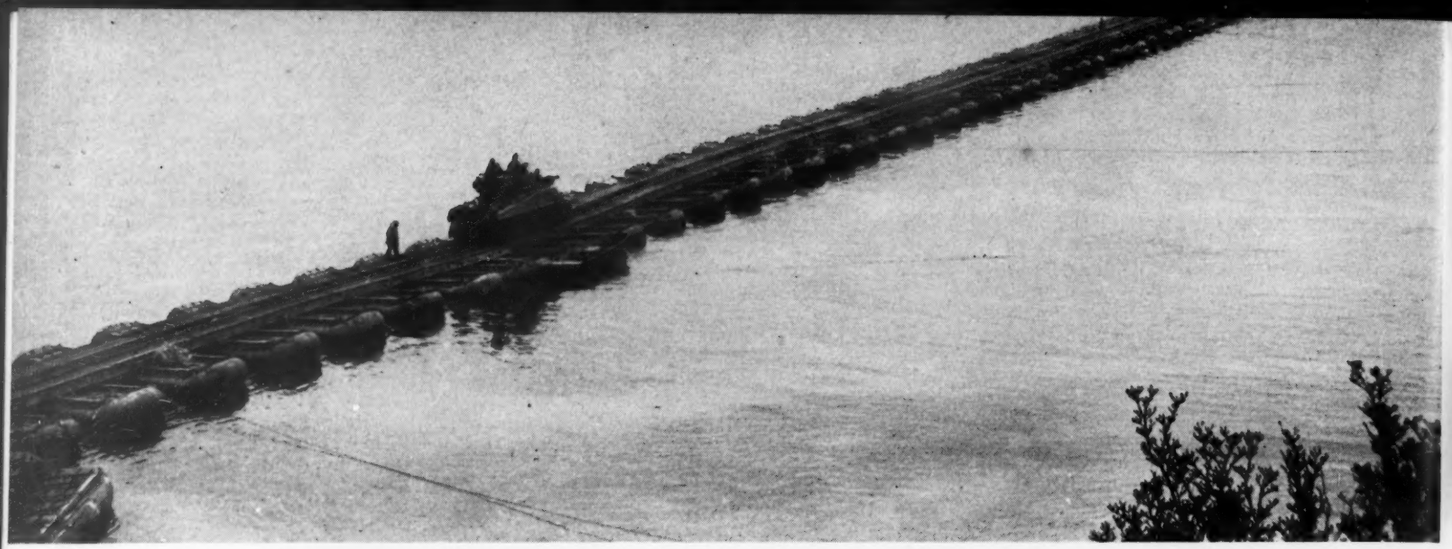
New airfields have either brick runways of a permanent type, or metal ones made of P.S.P. (Pierced Steel Planking). With the former, the main problem, apart from that of extensive drainage, which is common to both types, is to obtain from local sources enough stone, sand, cement and brick to produce a good all-weather surface. The chosen site, therefore, while fulfilling strategic requirements, must not be too far from the source of supply, otherwise yet another problem will arise—that of transport. Substantial though it is, both R.A.F. and Army road transport has so many vitally important tasks to fulfill that it can ill be spared in any large numbers for the purpose of conveying building materials to an airfield.

While flat areas abound in Holland, feasible airfield sites are few indeed. At the airfield under review the first problem was that of lowering the standing water level, taking into account the possibility of flood caused by heavy rain and extensive thaw. An intricate system of drainage covering many acres was laid down, incorporating a main drain of proportions akin to a small canal. For this canal alone, which is some 20 ft. wide, 8 to 10 ft. deep and about ⅜ mi. long, ten mechanical excavators were required. It

(*Continued on page* 170)

LEFT BEHIND BY GERMANS (below), this gasoline powered "jumping frog" tamper, weighing 1,000 lb., is used in preparing dispersal point.

DRAINAGE (below) is serious problem in Holland. Here R.A.F. ground crew plods through mud of flooded airfield to service Tempest aircraft.



PONTON BRIDGE built by Army Engineers carries tanks and other equipment over Rhine.

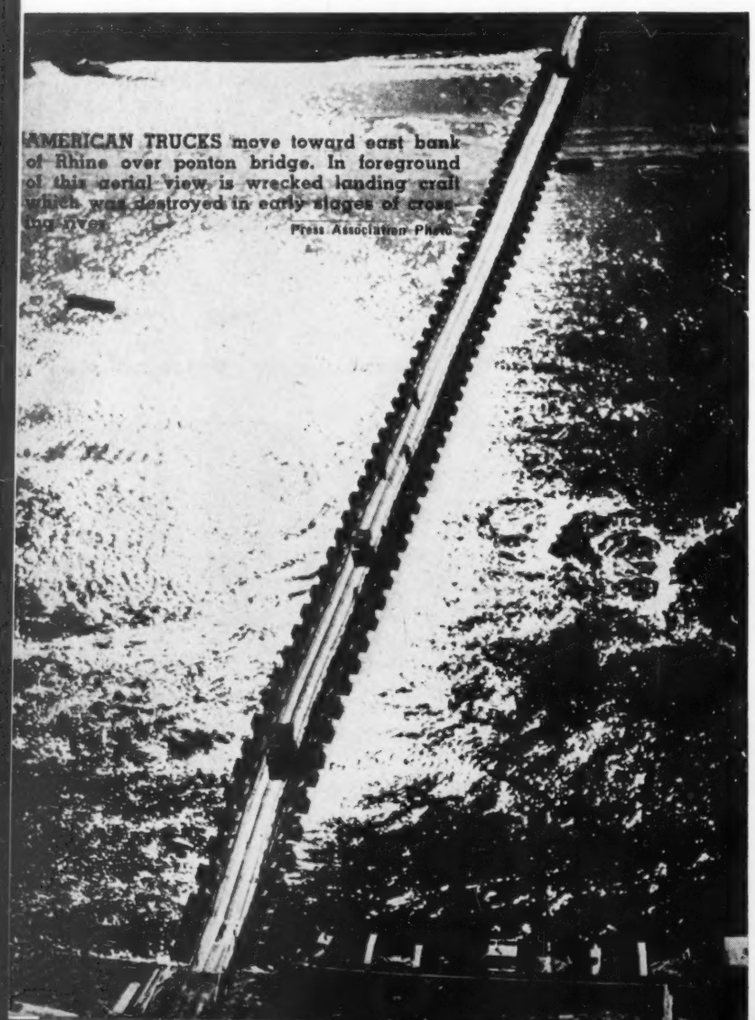
Engineers Span Rhine

With Ponton Bridges Before Remagen Steel Structure Falls

FIRST BRIDGEHEAD on the eastern bank of the Rhine was established by the American First Army at Remagen, Germany, as a result of a successful fight by Engineer troops to keep the seriously damaged Remagen railroad bridge in service while ponton crossings were built. Credit for capture of the three-span continuous truss railroad bridge belongs to units commanded by Brig. Gen. William M. Hoge, who directed the early work on the Alaska Highway. Engineer operations were commanded by Col. F. R. Lyons.

The bridge was a double-track structure with a total length of 1,068 ft. between abutments. The principal span was a 512-

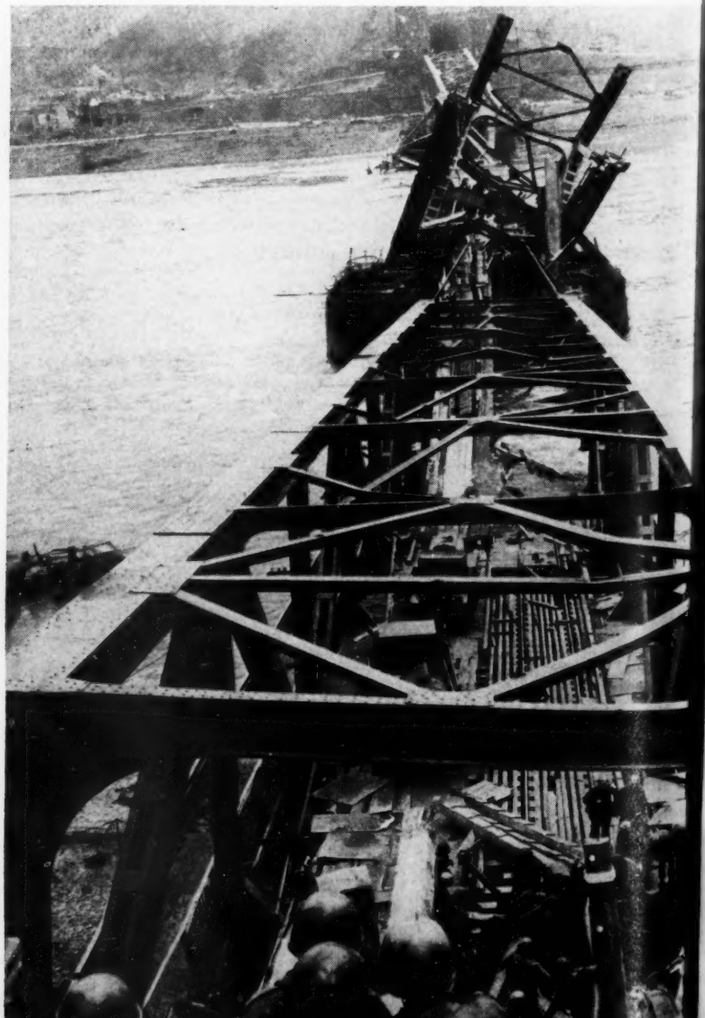
Signal Corps Photos



AMERICAN TRUCKS move toward east bank of Rhine over ponton bridge. In foreground of this aerial view, is wrecked landing craft which was destroyed in early stages of crossing river.

Press Association Photo

DIGGING AMID DEBRIS on western span of Remagen Bridge, Army Engineers help medics search for possible survivors of crash.



EAST END OF COLLAPSED BRIDGE blocks road to traffic. West end settled and pulled east end loose from moorings. Buckling of center span followed.

REMAGEN BRIDGE COLLAPSES and falls into river as Engineers work to save it. Structure was weakened by German demolition charges, indirect artillery hits and strain of carrying continuous stream of U. S. equipment.

ft. tied arch with side spans 278 ft. long. It was captured on March 7, partially damaged by German demolition charges, and the attempt to repair and save it began at once. It was necessary to rearrange the deck so trucks could use it and to repair a severed truss to accommodate tanks and railroad loads. Floor members knocked out by shells and bombs also had to be replaced.

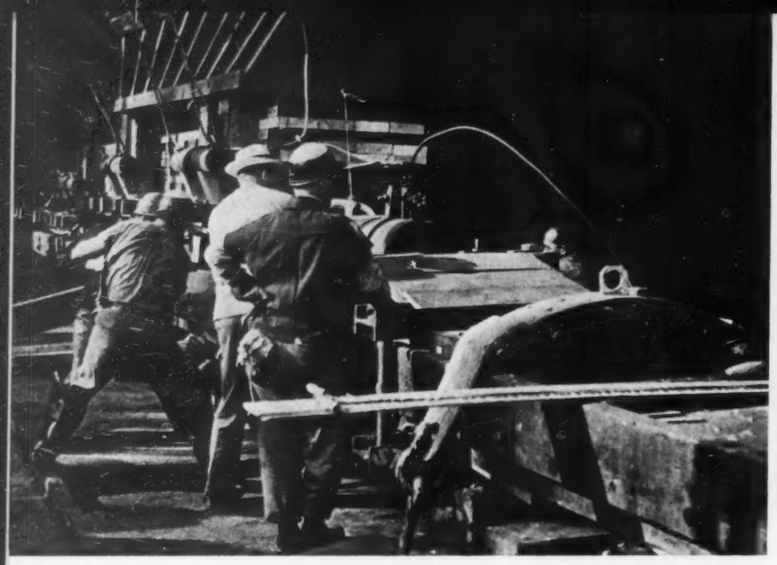
Repair work proceeded until March 17, when the Remagen Bridge crashed into the Rhine. By that time, however, ferry crossings had been established, using amphibious ducks and pontons as floats, until two ponton bridges could be completed.

First of the ponton bridges constructed was of the treadway type, 1,050 ft. long. The huge rubber floats were inflated in a street along the bank which was subjected to constant German shelling. Before the bridge was completed the Engineers lost three truck cranes, three air compressors, 25 floats and 17 men. A second bridge of heavy ponton construction was started simultaneously at another location to provide for two-way traffic. This second bridge was 985 ft. long. Both ponton bridges and ferries were in operation within 80 hr. after capture of the Remagen bridge and the first landings by American troops on German soil.

REPAIRS ARE BEGUN (below) by U. S. Army Engineer troops on Remagen railroad bridge across Rhine. Troops and armor rolled across this bridge to establish and hold first bridgehead on eastern bank of Rhine in Germany.

HOW They Did It

CONSTRUCTION DETAILS For Superintendents and Foremen



CUT-OFF LAUNCHING CREW gets set to release ship from ways at Sun Shipbuilding & Dry Dock Co., Chester, Pa. Two strips of heavy timber hold 5,500-ton ship after supporting blocks are removed. These tie sliding ways to fixed ways and are cut through in unison by crews on starboard and port sides. Four men operate each saw and spare is always at hand in case of need. Hydraulic cylinder is available to give supporting cradle a starting push, if needed, but is seldom called into use. Tanker is normally in water 46 sec. after being cut free.

Photo from Compressed Air Magazine

ARMY COMMAND CAR is converted to civilian use by Michael Baker, Jr., Engineers, of Rochester, Pa., which employs it in covering rugged terrain on highway, flood control and oil survey work in New England, Missouri River Valley, and Texas. Chief of this survey party, which operates command car in Beaver County, Pa., is L. M. HANEY (extreme right).

STORAGE CONTAINERS FOR BLUEPRINTS are made of transparent Tenite tubing. Cylinder keeps prints dust-free, prevents their becoming frayed and torn in storage and provides compact and orderly means of filing.

Eastman Kodak Co. Photo

SIDEWALK FINISHING MACHINE (below) services Landrey & Teegarden, Columbus, Ind., in constructing concrete widening strips 27 in. wide along both edges of 9-mi. stretch of pavement on U. S. 31 for Indiana Highway Commission. Machine, made by Jaeger, rides on steel form and on existing slab.

FIELD RADIO TELEPHONE enables CAPT. FRED N. DAVIS, master of U. S. Engineer Department, dredge "Grafton," to give directions from shore as dredge places fill to repair flood-damaged levee in St. Louis District, U. S. Engineers. CAPT. GRANT N. BERRYMAN, assistant head of navigation and dredging section, stands by.

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WOODEN SCRAPER is towed behind truck by U. S. Army Engineers to smooth out surface mud on road in Alsace-Lorraine, France. Signal Corps Photo

DRY-MIX CONCRETE reinforced with wire mesh is placed and screeded by hand inside heated canvas inclosure during cold weather on 1½ to 1 side slopes of sedimentation basin at Camp Breckinridge, Ky., by Bass Engineering & Construction Co., Birmingham, Mich., contractor for U. S. Engineers.

LUGS AND SHACKLE BOLTS are employed to insure tight, durable joints where portion of new 36-in. cast-iron water main in Seattle, Wash., is laid on steep slope in more or less unstable ground. Sand-cast pipe with thin cement lining, supplied by U. S. Pipe & Foundry Co., was laid by Superior Construction Co. under joint supervision of Charles L. Wartelle, city engineer, and Chester W. Morse, superintendent of water.

→

MODULUS OF RUPTURE for 6x6-in. concrete beam is read directly on Ames dial of Templeton-Kenly testing machine by KENNETH PLUMADORE, concrete technician on airport paving job for N. Y. District, Corps of Engineers, U. S. Army. Each beam is calipered to determine exact dimensions.

SLED-BORNE DIESEL POWER PLANTS are designed to supply emergency power in occupied countries of Europe. Generating units of 246 to 640 hp. are mounted on 10-ton steel skids welded at Graham-Paige Motors Corp. subsidiary in Warren, Ohio, to permit immediate operation without prepared bases.

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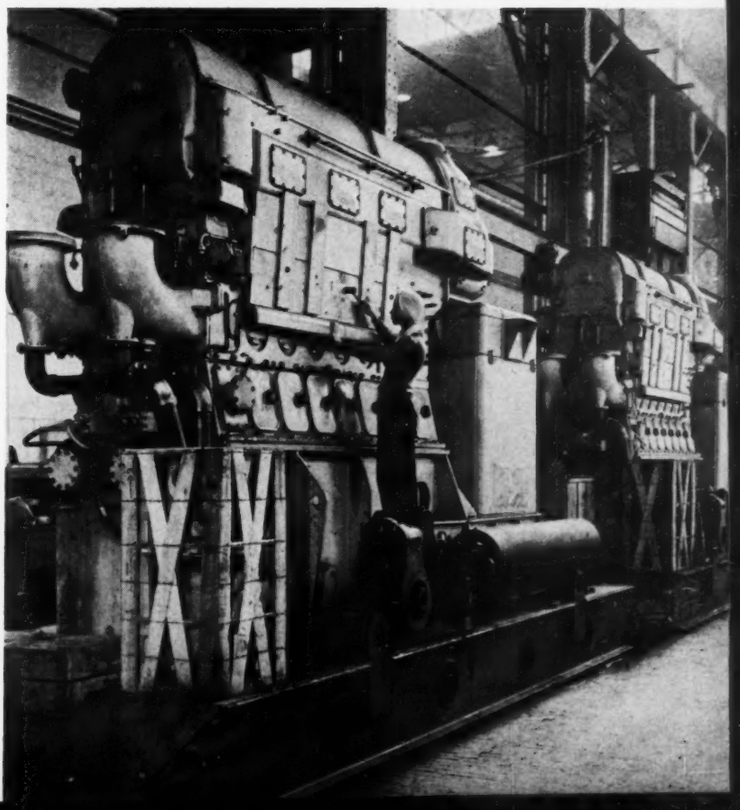


STEEL SHOE (below) is added to each link of British tank tracks to give them better grip and reduce unit weight on soft muddy ground. Shoes give tracks additional width of 6 in. British Combine Photo

Steel Cargo Ships

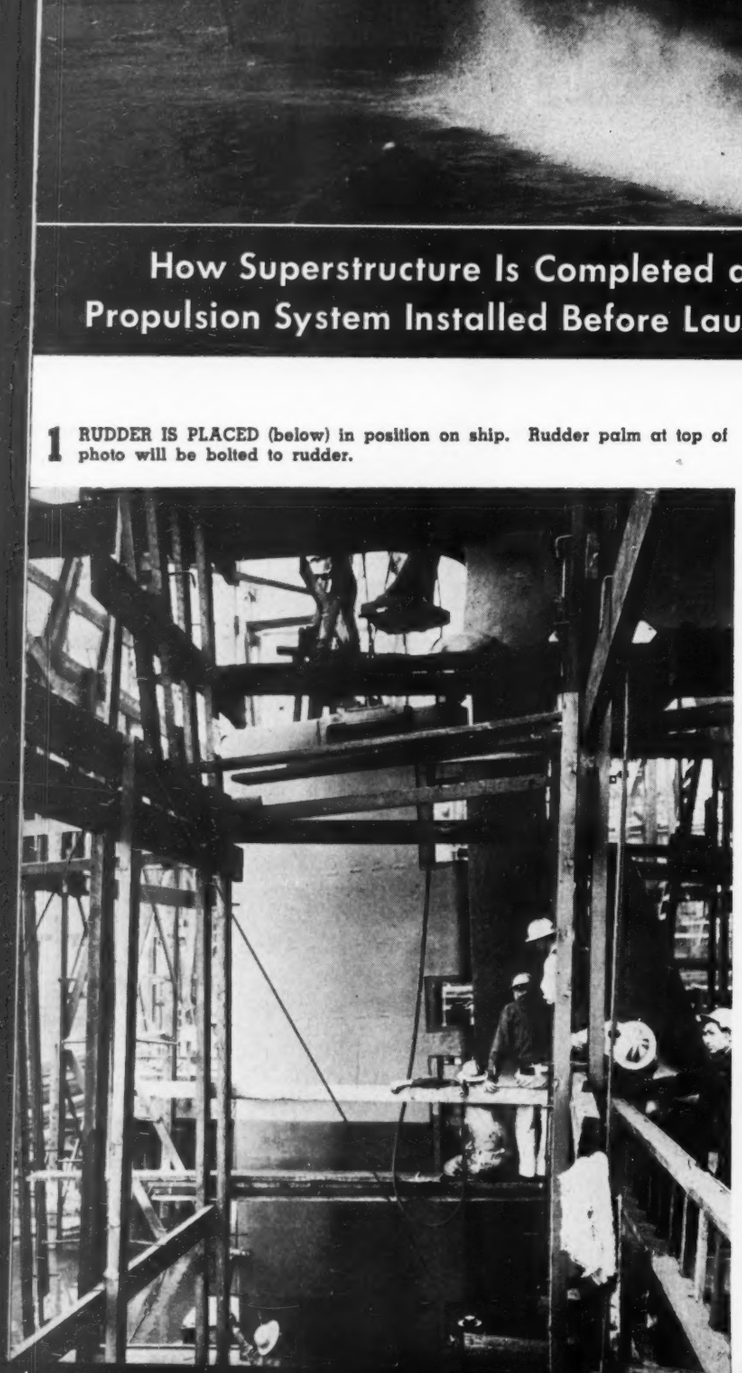
How Superstructure Is Completed and Propulsion System Installed Before Launching

Part 3 of article continued from March, 1945 issue

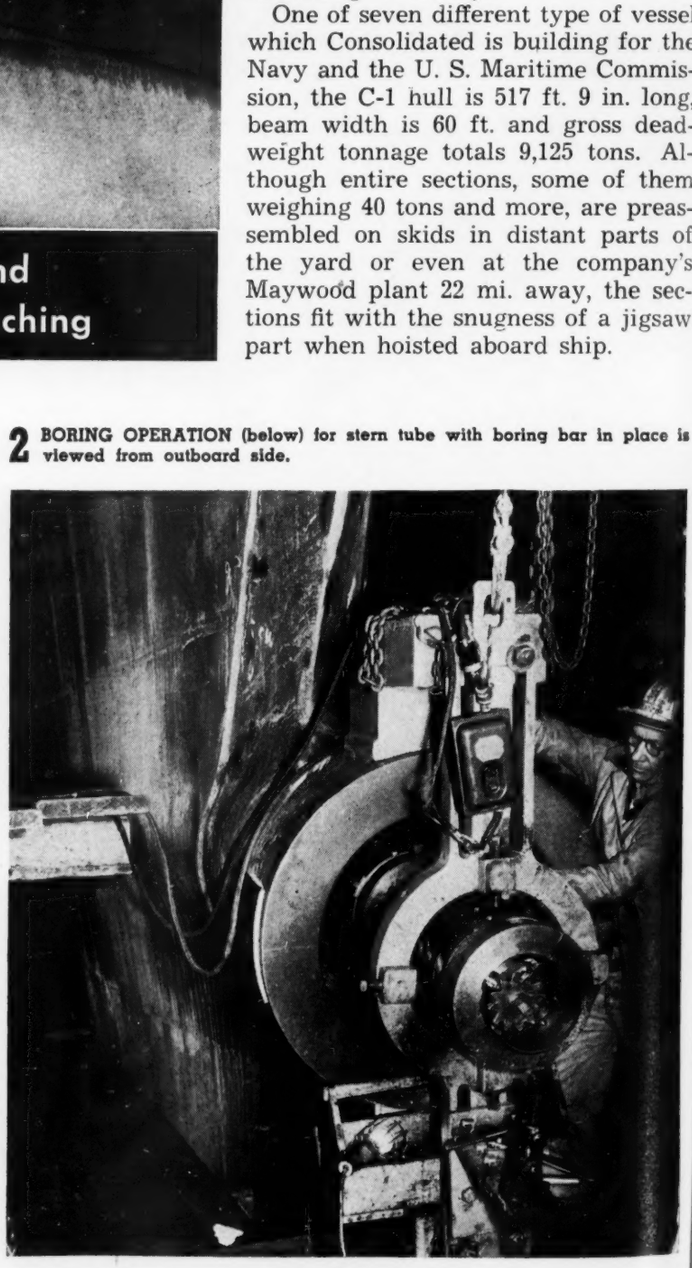
SINCE ITS KEEL WAS LAID in Consolidated Steel Corp.'s shipyard at Wilmington, Calif., the hull of this C-1 cargo and passenger vessel has mushroomed into form as huge, preassembled sections were swung into position. These operations were described in the November, 1944 and March, 1945 issues of CONSTRUCTION METHODS. Photographs accompanying this, the third and final article in the series, show completion of the superstructure and installation of the stern, rudder assembly and propeller, as well as the launching ceremony.

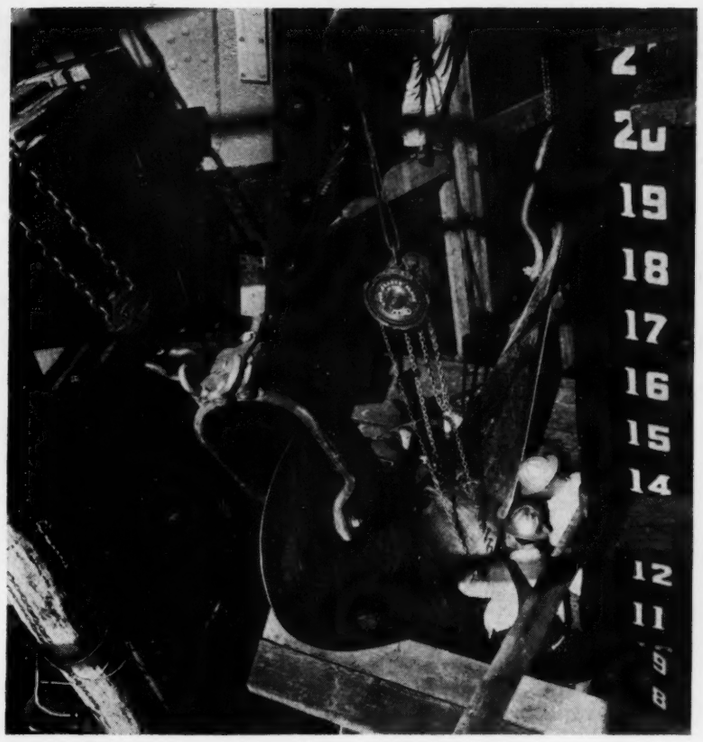
One of seven different type of vessel which Consolidated is building for the Navy and the U. S. Maritime Commission, the C-1 hull is 517 ft. 9 in. long, beam width is 60 ft. and gross deadweight tonnage totals 9,125 tons. Although entire sections, some of them weighing 40 tons and more, are preassembled on skids in distant parts of the yard or even at the company's Maywood plant 22 mi. away, the sections fit with the snugness of a jigsaw part when hoisted aboard ship.

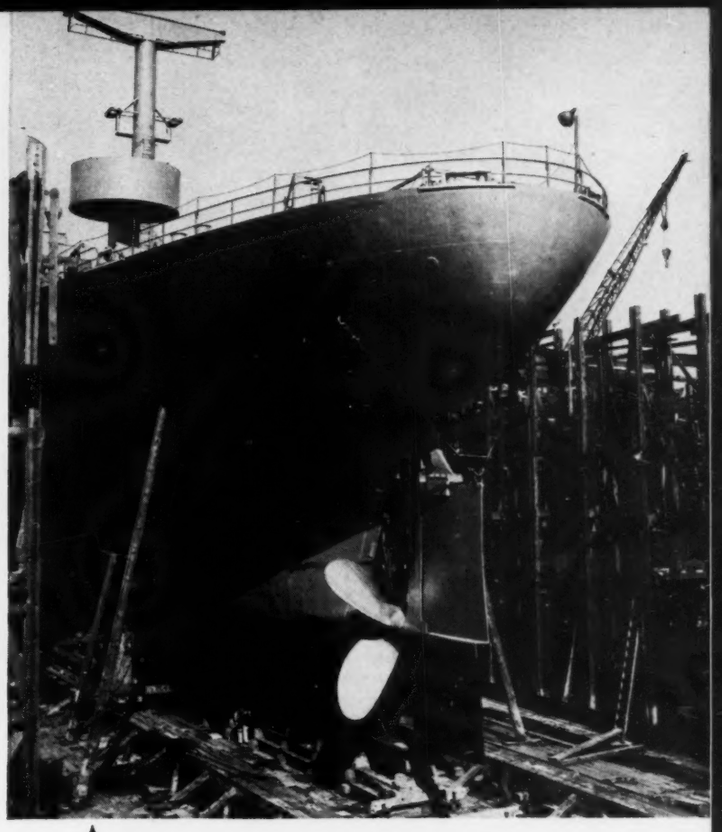
1 RUDDER IS PLACED (below) in position on ship. Rudder palm at top of photo will be bolted to rudder.



2 BORING OPERATION (below) for stern tube with boring bar in place is viewed from outboard side.

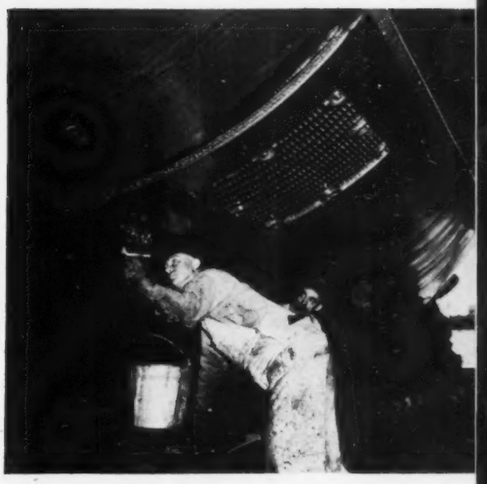






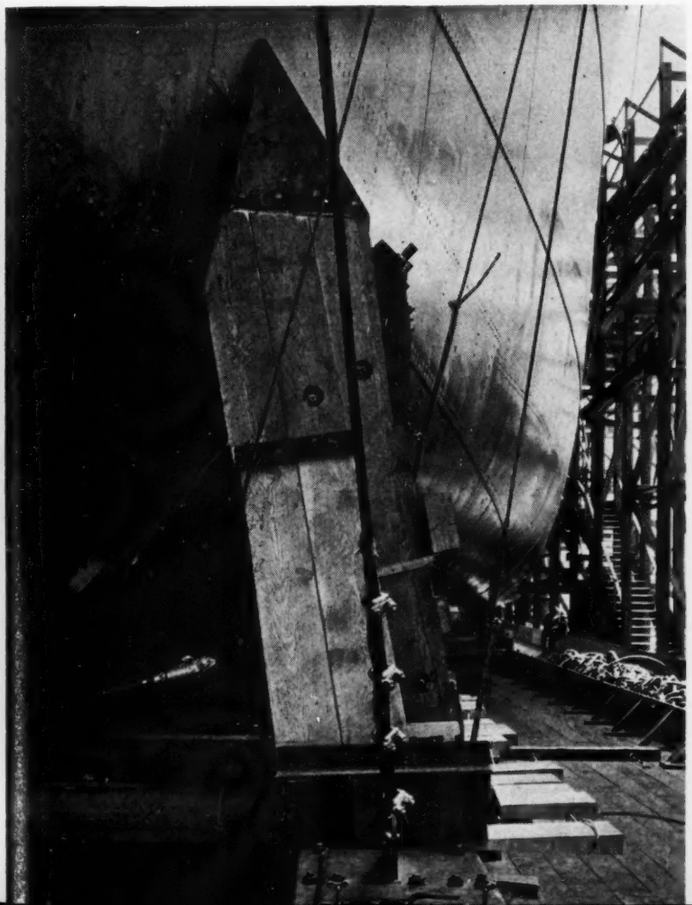
3 TEN-TON PROPELLER is lowered into position. Draft markings on rudder post indicate how much water vessel is drawing.

4 INSTALLATION of rudder and propeller (above, right) is completed. Connecting arm to rudder is rudder stock or palm which connects direct to steering engine. Offset in stern frame allows directed flow of water to propeller to obtain maximum efficiency.



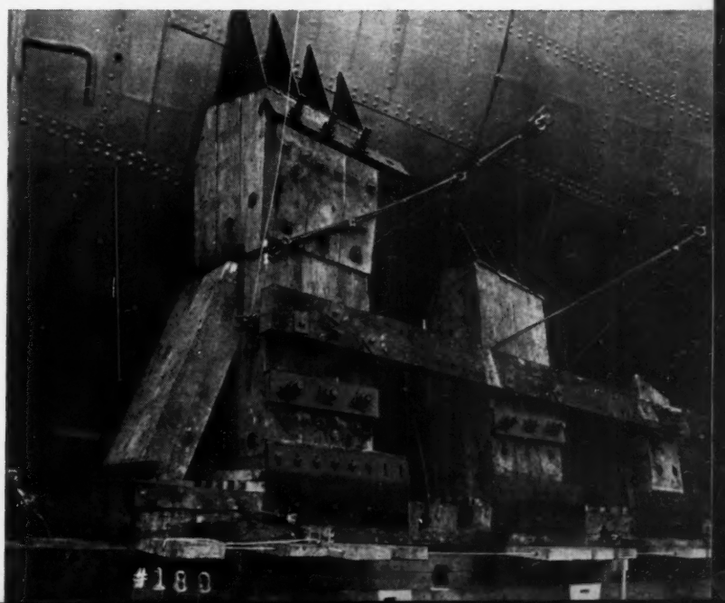
5 FORWARD POPPET (below) is in place. These timbers are trussed transversely under ship with cables and spreaders between wedge riders. They are securely fastened.

6 FINISHING TOUCHES (right) are applied by painter to bottom portion of hull. Approximately 6,000 gal. of paint are used on C-1 hull. Grill near top is strainer for sea chest.



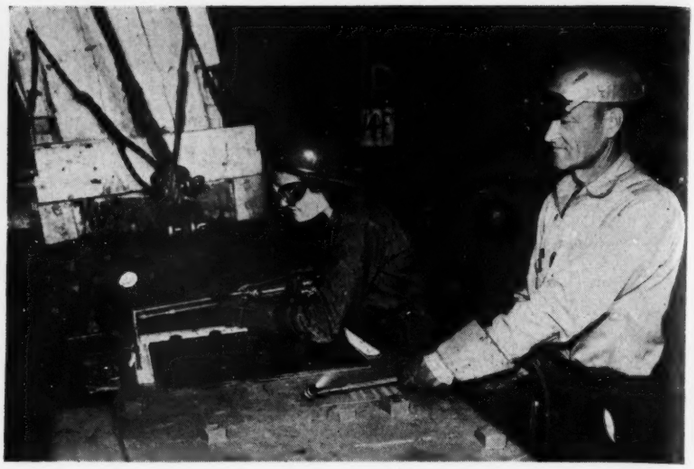
7 FORWARD END of launching cradle (below) is installed. Wedges in lower portion of photo are used to lift ship off blocks.

Continued on next page

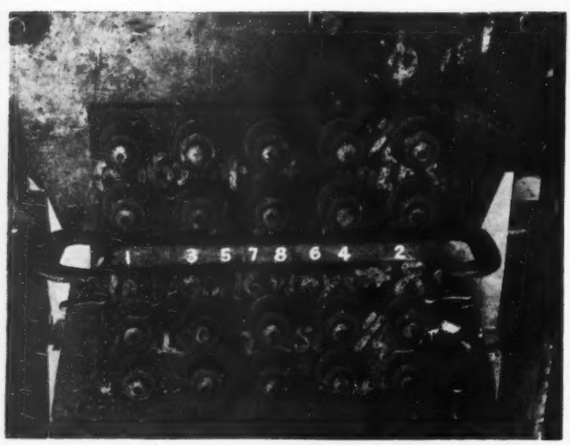


8 WORKMEN STAND READY to release dog shore (or trigger) on signal which is given to insure coordinated releasing of both port and starboard triggers. They are released about 2 min. before launching thereby leaving load on two burning plates at forward end of launching ways.

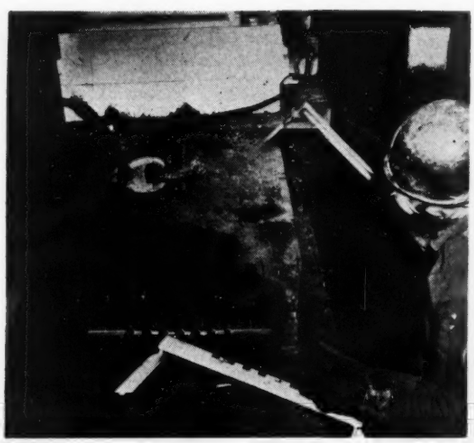
Steel Cargo Ships (Continued)



9 BURNER WAITS for signal to burn plates at forward end of launching way. All workmen have been removed from underneath hull. Extra burner stands by in case torch of first should fail.

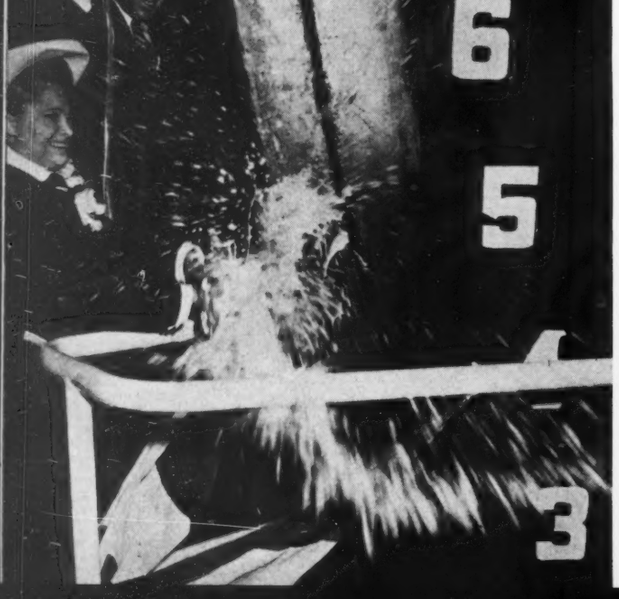


10 EIGHT POSITIONS are shown on this closeup of burner plate. On signal "Burn 1", No. 1 is burned to first hole. "Burn 2" calls for burning No. 2 to first hole on other side of plate. In most cases plate breaks after "Burn 4" and ship is away.

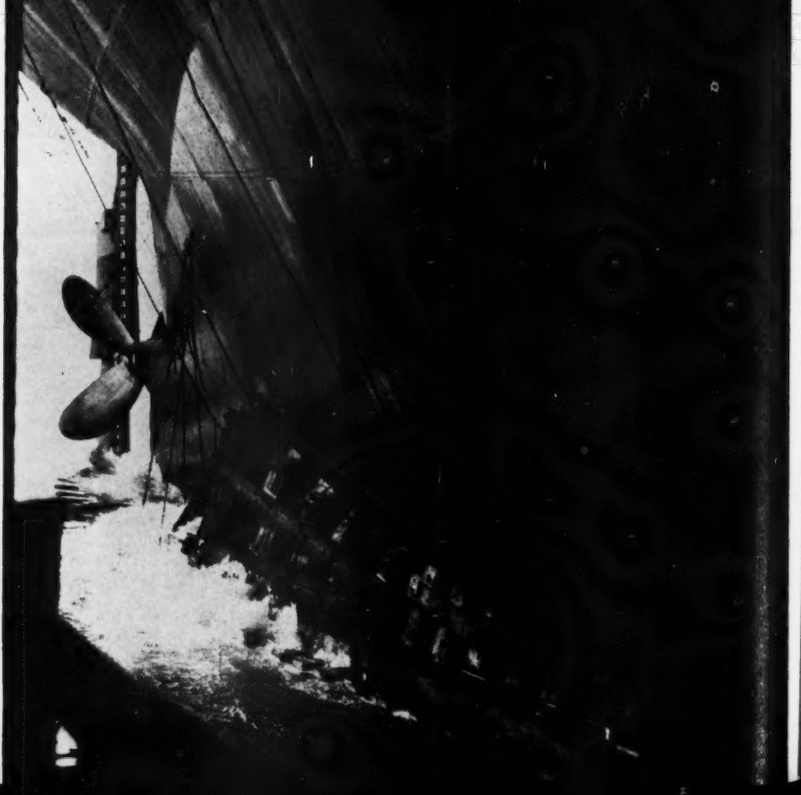


11 BURNER has completed burn and ship is starting down way. Note that center portion of bar broke without burning.

12 BOTTLE OF CHAMPAGNE (below) is broken on bow as vessel is christened. Man in background stands by to break bottle in case sponsor fails.



13 STERN OF SHIP meets water (right). Vessel is ready to be outfitted and put into service.



LEGAL ADVENTURES of TRACTOR CONN

By LESLIE JOBB

No contractor ever tries to be his own dentist or his own shoemaker. It is even more dangerous for him to be his own lawyer. There are, however, some legal rules which every contractor should know, and these rules may be explained in plain English without resorting to the jargon of the law, unintelligible to most laymen.

This series of articles, dealing with the Legal Adventures of Tractor Conn, a typical contractor anywhere in the United States, explains some of these legal points in plain language for the contractor. Each one is based on an actual decision of an American Court.

The Case of the Unauthorized Note

"Go up to Boston and buy the hardware for the new Elko contract," Tractor Conn ordered, "and have them draw drafts attached to bill of lading."

The foreman went to the Athens of America and bought $5,000 worth of hardware from the Hub Hardware Co.

"Draw a draft attached to bill of lading," the foreman suggested.

"No, you give us a note in Conn's name, and it'll be good enough for us," the Hub cashier suggested. The note was duly signed and Conn refused to pay it.

"My foreman had no authority to give a note in my name," Conn argued.

"Did you have any authority to sign the note," the Hub Co. wired to the foreman.

"None," was the wired answer.

"We'll sue you for the price of the goods we delivered if we can't sue you on the note," the company threatened and won out in the case of Emerson vs Province, 12 Mass. 237. The Courts of Indiana, Missouri and Ohio have ruled to the same effect.

The Case of the Strikes and Boycotts Clause

Tractor Conn agreed to erect a building according to certain plans and specifications within a certain time limit. The contract contained a proviso that "the liability of the said contractor to complete the said building within the said time is contingent upon strikes and boycotts."

When the building was about half completed, the brick plant that was furnishing brick for the building closed down, on account of a strike. As the strike was a general one in the brick trade, it was impossible for Conn to procure brick so as to complete the building on time.

"That clause in my contract about strikes and boycotts lets me out," was Conn's argument.

"No, that refers only to strikes of your own employees, not to outside strikes," the owner contended. Both parties went to Court and the New York Courts ruled in Tractor Conn's favor.

The Case of the Contractor's Mortgage

The owner was cautious, seeking to protect himself against all foreseeable contingencies, and Tractor Conn was of the same mind.

"You insist that I furnish the usual bond to make sure that I'll complete the building according to contract. That's all right, but I demand security that you'll make the monthly progress payment as the work goes on," Tractor Conn stipulated.

"I'll give you a mortgage on the land the building will be built on," the owner proposed.

"Suits me," Conn agreed. The mortgage was duly executed and recorded, but before the building was completed, a creditor of the owner attached the land.

"My attachment comes ahead of your mortgages on the contract payments that are still unearned," the creditor announced.

"No, my mortgage is valid for the full amount, so you can't prevent me from earning the future payments," Tractor Conn retorted and the Minnesota Supreme Court ruled in his favor in 15 N.W. 687.

The Case of the Additional Work

A certain New York building contract contained the following provisions:

(1) That Tractor Conn should complete the building by June 1.

(2) That the owner had the option of demanding certain additional work by paying $5,000 in addition to the contract price.

(3) That Conn was to pay a specified weekly penalty for any delay in completion.

The owner exercised this option and Conn did the additional work, but the completed building was not finished by June 1 and the owner demanded the specified penalty.

"When you demanded the extra work and I did it, that cancelled the clause of the contract binding me to finish by June 1," Conn told him.

"If that was your understanding of it you should have had the contract worded that way, but as it stands, the contract names a date for completion, with no qualifications, ifs nor ands, so you're bound by it," the owner replied. The New York Courts upheld this argument in Lever vs Brown, 30 Barb. (N.Y.) 416.

More Legal Adventures of Tractor Conn Next Month

Apprentices today

CERTIFICATE OF COMPLETION of apprenticeship (left) is awarded at end of training period, and signifies that apprentice has become full-fledged craftsman. It corresponds with diplomas awarded graduates of schools and colleges.

By MAURICE M. HANSON

Assistant Director, Apprentice-Training Service, War Manpower Commission and National Training Consultant for the Construction Industry

NOW AS THE BIG JOB of the construction industry for the war is nearing completion, contractors are setting their sights for the post-war projects with which they will be confronted. In preparation for peacetime activities, one of the greatest problems facing the industry is that of remobilization and training. During the last three years a large proportion of the industry's skilled workers have either entered military service or have shifted to other industries requiring similar skills, as well as to other occupations; and during this interval, apprentice training, necessary to replace the deficiency in skilled manpower, has inevitably been retarded.

In order to build up the industry's

CARPENTER APPRENTICE is instructed in operation of giant planer which molds top, bottom, and both edges of boards simultaneously.

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★

UNDER GUIDANCE of skilled workers (below), returned veteran learns to plumb door jamb.

INITIAL INSTRUCTION (below) in operation of mortising machine is given to apprentice.

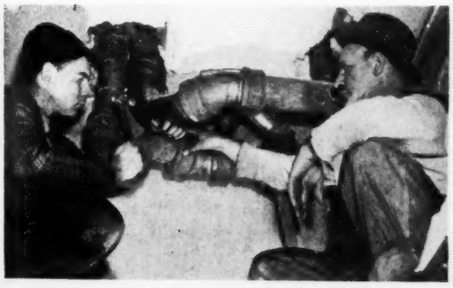
APPRENTICE (below) assists in nailing down sub-flooring.

Craftsmen tomorrow

skilled working force, contractors and labor in the various branches of the construction industry are working in close cooperation to put into operation area-wide apprenticeship programs. This movement to revitalize training activities has been initiated by the General Committee on Apprenticeship for the Construction Industry. This national committee, which is equally representative of contractors and labor, is promoting the expansion of apprentice training programs in every branch of the industry in every locality. This work is being carried out through the cooperation of contractor associations, labor unions and joint contractor-labor apprenticeship committees—national, state and local. National apprenticeship committees were established, before the war reached our shores, in five trades in the industry — carpentry, electrical, painting and decorating, plumbing and steam fitting.

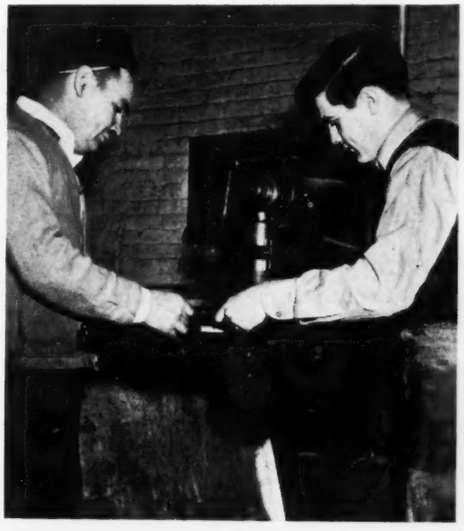
In establishing apprentice training programs, the industry has the assistance of field representatives of Apprentice-Training Service, War Manpower Commission and state apprenticeship agencies.

Since the first of the year 730 construction contractors in 22 cities have started training apprentices under newly established area-wide apprenticeship programs. These are in addition to the approximately 10,000 contractors already participating in area-wide programs placed in operation prior to 1945 in more than 200 cities and larger areas. A total of 837 area-wide programs are now established to train apprentices in the various construction trades, 40 of which have been established this year. In each area a joint apprenticeship committee is in charge of the program. Under these



CALKING of trunk line pipe system is done by apprentice under instruction of journeyman plumber.

PLUMBER APPRENTICE (below) helps journeyman install outside pipe connection for plumbing.



SHEET METAL APPRENTICE learns to operate high-speed cutter.

OXYACETYLENE WELDING is learned by apprentice in sheet metal shop.

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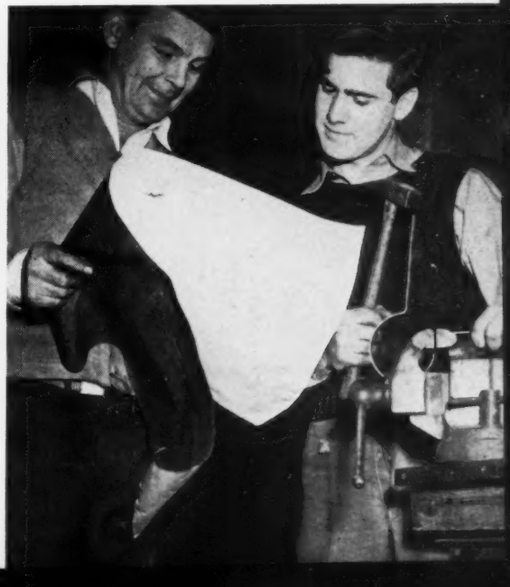
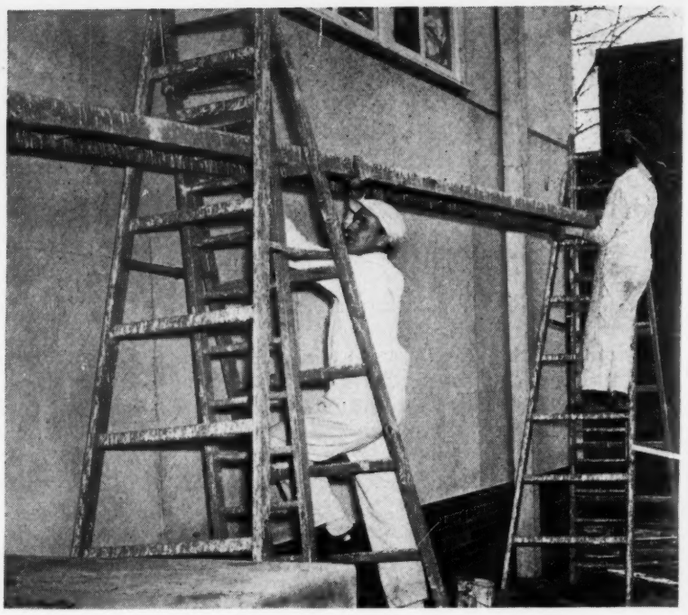
CRAFTSMAN TEACHES sheet metal apprentice (below) to form special bracket for construction job.

RETURNED VETERAN (below) trains for career in electrical contracting.

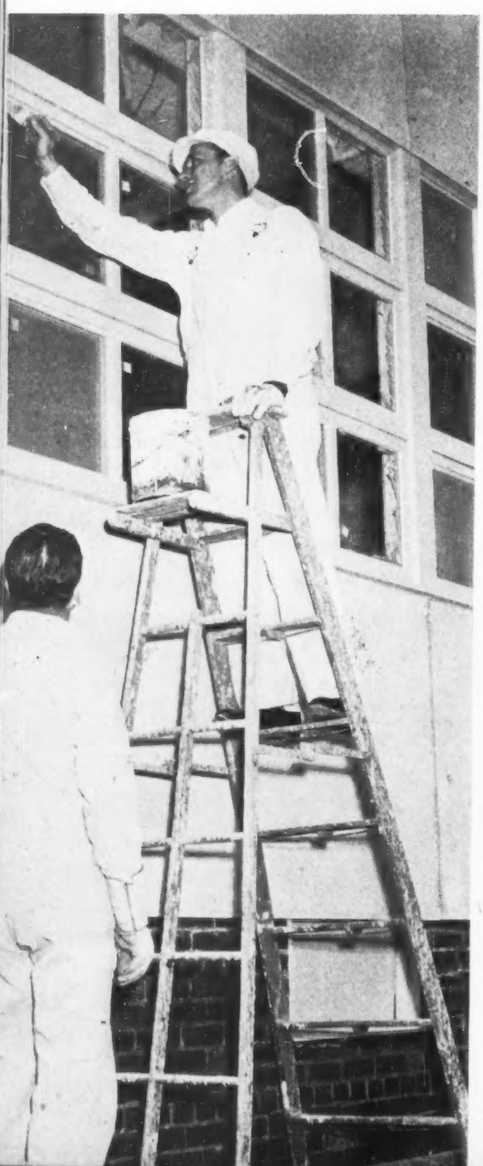


VETERAN APPRENTICE helps his foreman mix paint.



PROPER METHOD of setting up scaffolding for painting is learned by apprentice.

FORMER TRUCKMAN (below) discharged from military service, learns painting trade through apprentice training.



programs contractors are training apprentices on the job. In addition to this on-the-job training, apprentices receive related classroom instruction 4 hr. a week in local vocational schools.

Craft Training for War Veterans

Among the major obstacles during the war to continuance of apprentice training has been the shortage of young men on the home front qualified for this training. To offset this shortage, many employers have accepted for this training, in non-hazardous work, under-draft-age youths—those in the 16 and 17-year-old bracket, as well as men older than draft age and those disqualified physically for combat service. Today, a large proportion of apprentices is being drawn from the ranks of returning veterans. In addition to the fact that contractors and labor organizations are anxious to find worthwhile jobs for returning servicemen, whenever and wherever possible, they welcome the services of these men as potential craftsmen.

Veterans who are accepted for apprenticeship receive, in addition to the wages paid apprentices by contractors, monthly subsistence allowances from the Veterans Administration as provided by the "G. I. Bill". These allowances are as high as $50 per month to veterans without dependents and $75 per month to those with dependents. If a veteran has a "service-connected" disability, including a vocational handicap, he may be allowed an increased pension, if he is accepted for apprentice training. This pension is paid to veterans with 10 per cent or more "service-connected or aggravated disability" which includes a vocational handicap. Disability pensions are provided by the Act of Congress known as Public 16, 78th Congress. For obvious reasons, the government payments are adjusted, when necessary at some period in the apprentice training, so that the combined wage and government allowance received by a veteran will not exceed, at any time, the journeyman wage.

Step-by-Step Training

In the construction industry apprentice training takes from 2 to 5 years, depending upon the intricacies of the work in a trade and the variety of skills required. During their term of apprenticeship, apprentices are trained both on-the-job and in the classroom in one series of operations after another until they have mastered a craft. As they progress from one period of their training to another, their wages are advanced. Specified in a written apprenticeship agreement are the work processes in which an apprentice is trained, the length of time required to master the work during each period of the training, and the wages received during each period. When an apprentice completes his training, he becomes an all-round skilled worker and is awarded a Certificate of Completion of Apprenticeship in recognition of his new journeyman status. These certificates are issued by state apprenticeship agencies, the Federal Committee on Apprenticeship in states in which no state agencies have been established, or by a national apprenticeship committee representing a trade. The federal committee is the national policy-making body on apprentice training in American industry.

APPRENTICESHIP AGREEMENT

BETWEEN EMPLOYER'S AGENT AND APPRENTICE

THIS AGREEMENT, entered into this 8 day of May, 1945, between Joint Apprenticeship Committee (Name of apprenticeship committee, trade union, or union) hereinafter referred to as the EMPLOYER'S AGENT and A. P. Prentice, born August 21, 1921 hereinafter referred to as APPRENTICE (and ..... hereinafter referred to as his {PARENT. GUARDIAN. (Conservator) ..... below to enter into Apprenticeship Agreement.

TERMS AND CONDITIONS

1. TERM OF APPRENTICESHIP AND PERIOD OF PROBATION
The term of apprenticeship shall be 8,000 hours with the first 500 hours as the probationary period.

2. MAJOR PROCESSES IN WHICH THE APPRENTICE IS TO RECEIVE INSTRUCTION AND EXPERIENCE (Under this heading state the different branches of the trade to be taught and the approximate time the apprentice shall work at each branch.)

Residential . . approximately 1,500 hours
Branch circuit work.
Service and distribution work.
Signal work.

Commercial . . approximately 4,000 hours
Conduit - heavy and thin wall, concrete and mill type construction.
Metal molding.
Installation of wires, cables and panel boards.
Wiring devices, lighting fixtures and equipment.
Cable splicing.
Welding.
Automatic control work.
Neon sign work.
Specialized lighting.

Industrial . . approximately 2,000 hours
Sub-station.
Switchboard.
Bus duct, wire ways.

Specialized Work . . approximately 500 hours
Temperature and refrigeration controls.
Fabrication, assembling and wiring of fixtures.

3. GRADUATED SCALE OF WAGES TO BE PAID THE APPRENTICE

1st 1000 hours	. . . . .	45 %	of the journeyman's wage
2nd 1000 hours	. . . . .	50 %	" " "
3rd 1000 hours	. . . . .	55 %	" " "
4th 1000 hours	. . . . .	60 %	" " "
5th 1000 hours	. . . . .	65 %	" " "
6th 1000 hours	. . . . .	70 %	" " "
7th 1000 hours	. . . . .	80 %	" " "
8th 1000 hours	. . . . .	90 %	" " "

4. NUMBER OF HOURS PER DAY AND TOTAL NUMBER OF HOURS PER WEEK TO BE WORKED BY THE APPRENTICE
8 hours per day and 40 hours per week.

5. NUMBER OF HOURS OF SCHOOL INSTRUCTION PER YEAR TO BE ATTENDED BY APPRENTICE, AND NAME OF SCHOOL. (144 hours per year is the minimum requirement.)
144 hours per year related school instruction at the City Vocational School.

6. SPECIAL PROVISIONS. (Write here any terms and conditions not elsewhere stated in this agreement.)
Upon the satisfactory completion of his apprenticeship, the apprentice shall be issued a Certificate of Completion of Apprenticeship.

INDIVIDUAL APPRENTICESHIP AGREEMENT is signed by apprentice and his employer or representatives of joint apprenticeship committee or other organization acting as employer's agent. Specified on back of agreement are work processes in which apprentice is trained, working time and wages during each period, credit for past experience and other provisions related to his training. Agreement is officially registered with state apprenticeship agency or Federal Committee on Apprenticeship.

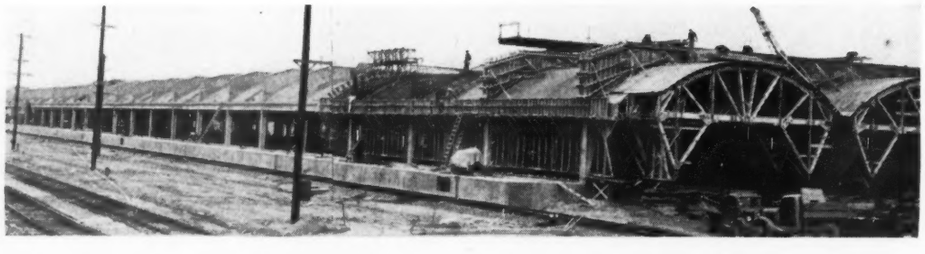
HOW TO LAY BRICK under wet conditions is taught apprentice by craftsman.

CLASSROOM INSTRUCTION (below) at local vocational schools for 4 hr. a week supplements on-the-job training of apprentices.

New Concrete Warehouses

Built With Multiple-Barrel Roofs to Store Signal Corps Materiel

MULTIPLE-BARREL CONCRETE ROOFS, designed according to ZD system cover Signal Corps warehouses 1,000 ft. long and 180 ft. wide.



MOVABLE FORMS (above & below) for receiving concrete for arch roof slabs are constructed of wood trusses with plywood covering. Forms are equipped with wheels riding on steel rails. Usual pour included full width of building of four bays and 80 ft. in length.

SUPERIOR STORAGE CAPACITY for U. S. Signal Corps materiel to supply contingents on the fighting fronts throughout the world, has been provided at the Signal Corps Depot at Dayton, Ohio, through employment of ZD roofs in the construction of four huge warehouses.

Concrete was used throughout in the building of the big warehouses and the depot boiler house, and for floors and walls of all twenty-four other structures. To provide roadways for the entire depot, 2½ mi. of 22-ft. concrete pavement was laid.

Two of the warehouses, 1,000 ft. long and two 1,080 ft. long, uniformly 180 ft. wide, provide approximately 750,000 sq. ft. of storage space. ZD roofs were selected for three reasons: first, for their economy of construction effected by use of movable forms; second, greater storage capacity provided than would be the case with ordinary flat roof type of construction; and third, superior lighting permitted by smooth ceiling construction.

Each of the four warehouses has a 16-ft. platform on each side for the full

length, providing a total of 133,000 sq. ft. of platform space. Under these platforms space was utilized for steam pipe tunnels, obviating the necessity of laying them under the floor slab, or in the ground.

Structurally the warehouses are of reinforced concrete framing, with concrete masonry curtain walls. Framing is of ZD rigid frame type with reinforced concrete multiple-barrel roofs. Barrels span 45 ft. with a column spacing of 40 ft. Expansion joints are spaced 120 ft. apart.

From the floor level to the spring line or underside of beams is 14 ft. and to underside of roof slab at center of bays is 22 ft. 5 in.

Heating is by means of suspended unit heaters supplied with steam from the central heating plant. Roof slabs are insulated with 1 in. of fiberboard mopped to the deck and held with concrete nails. For fire protection of the highly critical war material contents, concrete masonry fire walls were installed every 160 ft.

Due to the rigid type of construction, the amount of differential settlement between adjacent footings was limited to ¾ in., and the bearing pressure was re-

(*Continued on page 166*)

PLATFORMS 16 FT. WIDE extend full length and on each side of each warehouse. Steam pipe tunnels utilize space under platforms.

ADMINISTRATION BUILDING is E-shaped in plan, with main portion 272 ft. long and 41 ft. 2 in. wide.

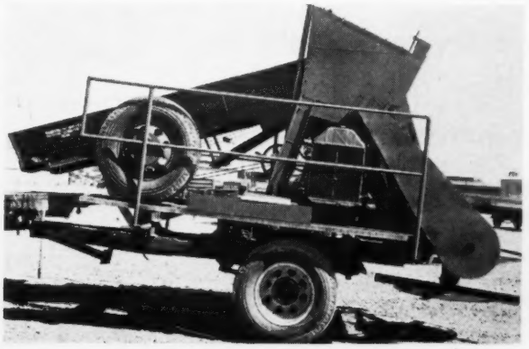
Straw Spreader FOR AIRFIELDS

TO CONQUER a dust palliation problem on new airfields where wind raises clouds of gritty dust endangering airplane engines, the Sacramento, Calif., division of the U. S. Army Engineers has devised a special-purpose straw spreader with parts from various sources. The machine, a hand-made assembly weighing about 5 tons, spreads straw which is disked into the ground surface, creating an obstacle to rolling dust particles and reducing wind velocity along the ground.

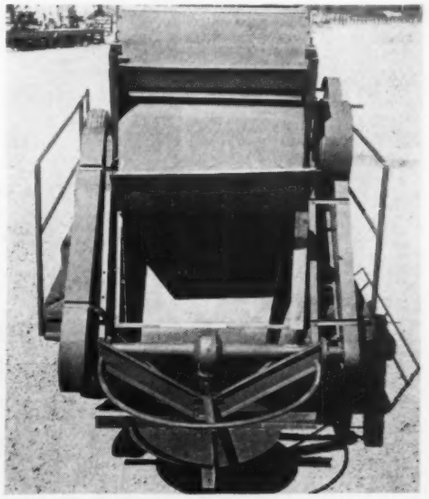
Mounted on a heavy trailer, cut down from a 10-ton four-wheel job with the frame bent into a "Vee" at the coupler, the device rolls on four high-pressure truck tires and is towed behind a truck loaded with bales of straw. In operation, the bales are picked up on a conveyor, which was salvaged from a piece of farm machinery, and hoisted to the hopper at the top of the machine. Here teeth of a whirling drum shred the straw from the bales and drop it into a second hopper. Loose straw then falls on to the spinning spreader disk, which distributes it in a swath 25 ft. wide at the rate of 12 min. per acre. A tractor-drawn disk harrow follows the spreader and presses the straw into the ground with the ends sticking up to form miniature

(*Continued on page 182*)

CONVEYOR at front of machine is used to lift baled straw to shredder, made from 24-in. steel pipe with standard harrow teeth welded to surface. Device is mounted on two-wheel grader.



ELEVATOR, engine, hoppers and spreader disk are seen in this side view of machine. Radiator from Caterpillar tractor was substituted for smaller Ford radiator.



SPREADER DISK is driven through rear axle of dust palliation machine. Several drives throughout machine are made from standard chains and sprockets, as torch was used for assembly.

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Bristling with power and built to use it, track-type tractors are your most useful machines — handle a greater variety of jobs, go most anywhere at any time, operate efficiently under severest conditions. Work in mud, sand, clay, gravel, rock, dirt . . . in lowlands or mountains, on steep grades, narrowest quarters, any climate!

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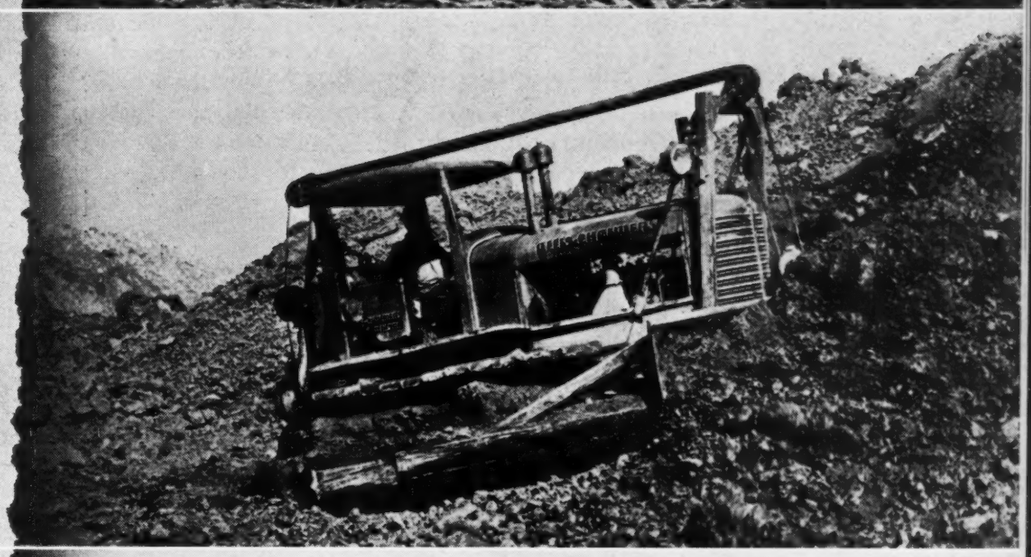
Just hitch it to the drawbar! A track-type tractor efficiently handles any pulling job—hauling scrapers, graders, sheepfoot rollers, rippers and other equipment.

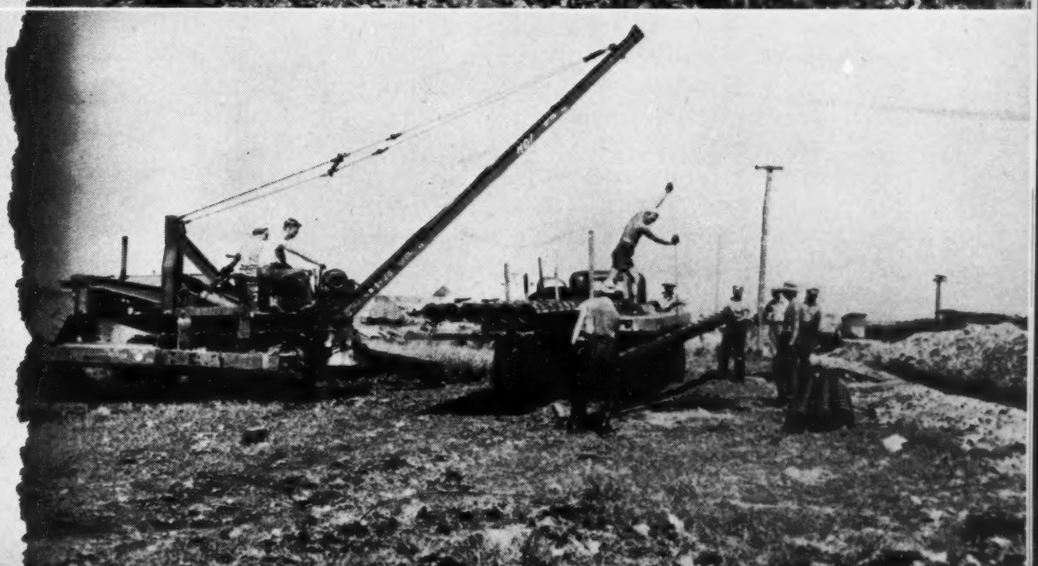
Push

Many are the jobs that call for a track-type tractor's ground-gripping traction and great pushing power — bulldozing, pusher-loading, clearing, boosting other equipment!



Lift

You can make a crane, a hoist or a shovel out of a tractor by simply mounting the auxiliary equipment. Your track-type tractor is your basic tool!



SUSTAINED CONSTRUCTION ACTIVITY

One Step Toward High Level Employment

IN the 34th editorial of this series, it was pointed out that sustained prosperity, based on high level employment, was a major postwar goal accepted by government, management and labor.

That editorial developed the theme that, if the goal were to be approached without undue sacrifice of our essential liberties, we must forego the search for magic panaceas, and follow the harder but more promising course of analyzing step by step, and industry by industry, the measures that might contribute toward the end sought.

This is the first of a number of editorials following such a particularized approach. It will examine the role of the construction industry in forwarding sustained prosperity.

☆ ☆ ☆

The influence of construction upon the general level of economic activity is important but not decisive. The claim is frequently advanced that major fluctuations of the business cycle might be ironed out by a properly devised and timed public works program; but any examination of the relatively modest contribution of construction activities to total national output will demonstrate its extravagance.

In the twenty years from 1920 through 1939, the value of new construction averaged just over 8½% of the gross national product. If we add repair and maintenance expenditures, the total is increased to a little over 12% of the gross product. But approximately two thirds of the construction of this period was privately initiated, and only one third was represented by government construction, federal, state and local combined. To expect that we can level out the peaks and valleys of our whole economy through manipulating the 4% portion that is represented by government construction is to expect a very small tail to wag a very large dog.

In fact, the record of construction activity in the past has been on the side of disequilibrium rather than stabilization. In boom times construction activity has climbed to relatively higher peaks than those reached by the economy as a whole; in depression periods it has fallen to deeper troughs. Aside from the special work relief program of the depression thirties, the performance of public construction in this respect is little better than that of private. New government construction mounted with the general trend of the boom from 1921 to 1929, thereby adding its weight to the inflationary trend.

Instead, then, of expecting the construction industry to stabilize our whole economy—a task clearly beyond its power—it would seem appropriate to ask that it look to the more attainable goal of leveling out its own violent fluctuations. If this can be done, many of the most vexing problems of the construction field and of its sphere of influence will be mitigated, employment will be regularized in one important segment of industry where the past record has been particularly uneven, and one aggravating contribution to general business instability will be removed.

The achievement of these highly important, if limited, aims will require the thoughtful, vigorous, and concerted cooperation of management and labor in the construction industry, of a variety of governmental agencies, and of those who direct the sources of construction credit. Of the many measures that must be woven into an ordered program, it is practicable here to present only the broad outline of those which seem to offer the greatest potential usefulness.

☆ ☆ ☆

1. Stabilization implies the holding of a balance rather than a freezing at a given level. No rigid formula for a most desirable level of construction activity is possible or desirable. However, it may be accepted as a reasonable initial premise, that we could sustain in the future without major distortion something like the 12% ratio of total construction to gross national product that has been approximated in the past. If it is to serve as an useful reference point, such a generalized premise must be subjected to constant testing both nationally and locally. There must be careful and continuous scrutiny for signs of demand saturation, cost inflation, and labor shortages, all danger signals of far greater reliability than any percentage formula.

The first requisite then is the general availability of information along such lines, far more complete and current than has hitherto been at hand. The second is a general will to hold building activity at a level as high as but not higher than we probably can sustain. Once this principle is accepted, the problem becomes one of marshalling all available instrumentalities to forward it.

2. Public construction, although too small to exert a decisive influence upon economic activity as a whole, can

(*Continued on page* 98)

Teamwork
ON TIMKEN BEARINGS

The Be-Ge 12 yd. Scraper built by Be-Ge Manufacturing Company, Gilroy, California, and "Caterpillar" Diesel D7 Tractor combination working here make a great fighting team when it comes to moving dirt and getting work done on time.

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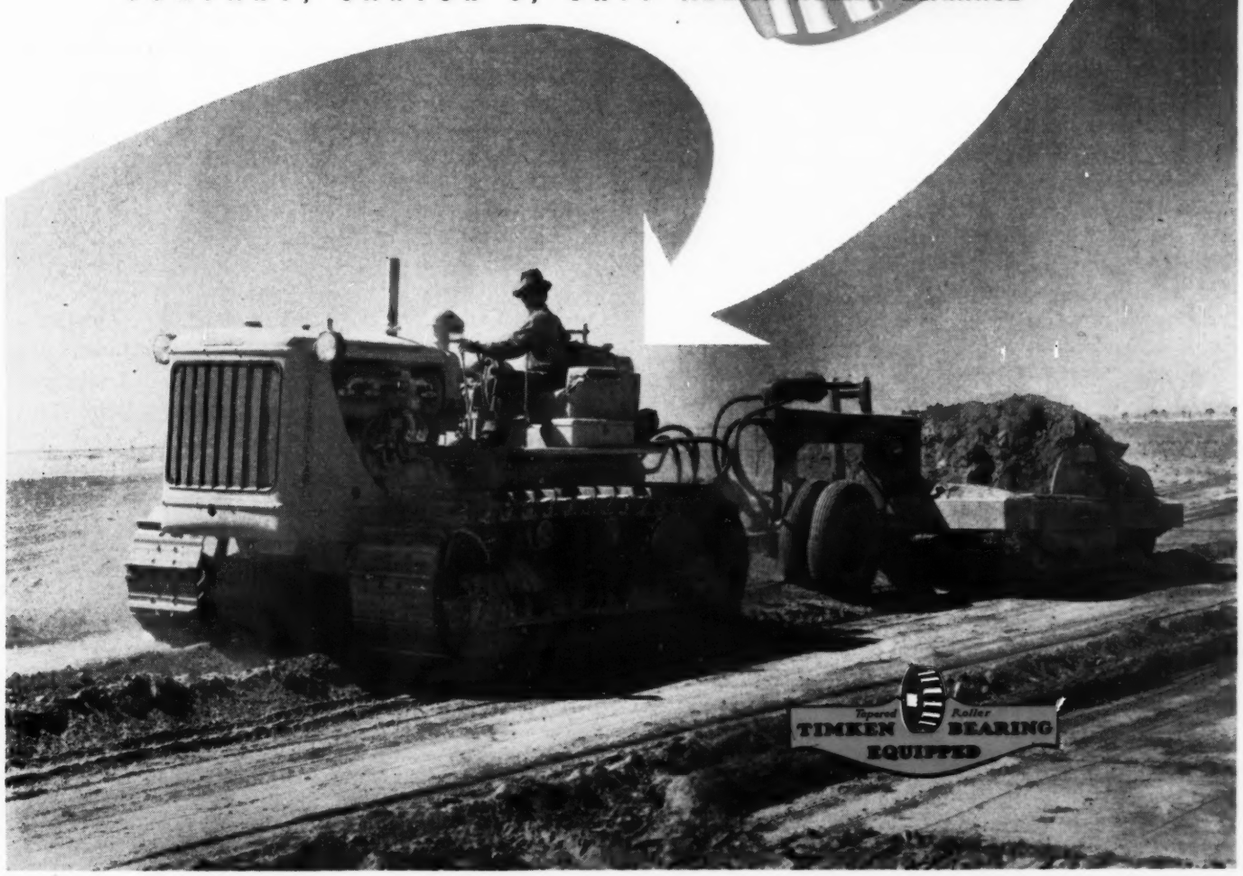

condition construction trends to a major degree. If, in the decade following the war, government construction approximates its 1920 to 1940 average of one third of all construction, its properly timed impact could do much to level out the construction cycle.

To do this most effectively, public construction should be deferred where and when private building is going forward at a satisfactory pace, and should be started when and where private activity shows undue slack. All government construction does not lend itself to such adjustment. But a large portion of it could be held up for the three to five years which, upon past experience, would provide the necessary leeway to counteract the more violent fluctuations in private building.

Such a program presents numerous difficulties both political and administrative. None should be insurmountable, and the results promise to be of sufficient moment to justify the extraordinary effort that would be required to coordinate federal, state and local government programs. Here is an excellent forum for testing whether or not government economic activity can be made to supplement rather than supplant private effort to serve ends upon which all are agreed.

3. Since private building, postwar as in the past, must supply the preponderant share of construction activity and employment, costs will continue to play a dominant role in determining levels of operation. Wartime restrictions have created formidable backlogs of deferred demand for most types of private, and for many of public, construction. Such demand is so great that it almost certainly will provide the impetus for a postwar building boom of several years duration. There is considerable doubt that in the beginning our building trades, dislocated by war and at low ebb, can organize rapidly enough to carry their share of the anticipated general advance.

However, if former patterns hold, building activity, after a lagging start, will soar, costs will mount, and eventually will saturate effective demand with resultant collapse. That, of course, is precisely the sort of a situation we are seeking to avoid. Crucial to this end is the prevention of rising costs or, better still, the reduction of building costs from present swollen levels.

A recent study by technicians of the War Production Board on the outlook for private housing construction illustrates the point. From 1900 to 1940 the number of housing units built in this country closely matched the statistics of new family formation. The former ran considerably ahead of the latter from 1920 to 1929, and fell behind by the same margin in the following decade.

If the market for new houses were to be similarly limited for the period from 1940 through 1949, the effective demand for new housing during the last five years (1945-1949) is estimated at 3,000,000 units. That is after allowing for houses built from 1940 through 1944, and for vacancies, demolitions, and other factors. If, however, prices could be reduced to 1939 levels, the 3,000,000 unit demand is estimated as increasing to more than 7,000,000 units. Since the latter figure is substantially beyond our production capacity for the period, a backlog would be created that would support an effective sustained demand for the subsequent decade (1950-1959) of 1,000,000 units per year, as against half that amount if rents and sales prices mount with increasing incomes.

The precise accuracy of such an estimate may well be questioned. There can be no question as to the general validity of the point illustrated. The progressive lowering of construction costs will stimulate demand in this field as it has in others. Building management, labor, and their suppliers and customers stand to gain from such a result. Unnecessary restrictions against the adoption of improved technologies and increased productivity should, therefore, be removed, whether imposed by codes of government, regulations of unions, collusion of managements, or inertia of workers. Unless there are compelling social justifications such restrictions must be judged harmful to the whole economy.

4. Numerous other measures could contribute substantially to increased and increasingly stable construction activities. Space remains only to stress the importance of careful consideration for the use of credit facilities as a means of stabilization. In recent years the establishment of the Federal Housing Administration provided a needed stimulus to mortgage lending in the field of housing. The modern pattern of long-term mortgages, providing for regular amortization as well as interest, should be a steadying factor in periods of liquidation. However, there appear to be further possibilities for using credit facilities as a brake when construction activity threatens to climb beyond a level that can be sustained. If public and private lending agencies could devise sound means for raising mortgage rates, increasing down-payment requirements, shortening amortization periods and basing value appraisals upon normal rather than inflated costs, they might exert a healthy influence against the tendency of the construction bubble to inflate until it bursts.

☆ ☆ ☆

There is no royal road to sustained high level employment. There is not even a single path to assured construction stability—there are many paths, all strait and narrow and all paved with bruising cobbles. This is true for all other major segments of industry.

It is easier to seize upon a magic formula such as monetary control, or deficit spending, or any one of a score of others, than to undertake an intricate task of piecemeal exploration. But only the latter course will lead to prosperity.

President, McGraw-Hill Publishing Co., Inc.

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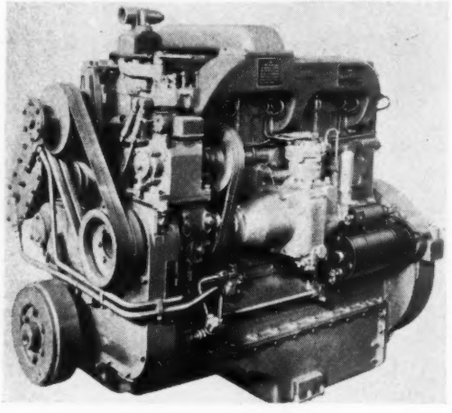
CONSTRUCTION EQUIPMENT NEWS

MAY, 1945 REVIEW of Construction Machinery and Materials

HIGHER SPEED, HIGHER HORSEPOWER. SIX-CYLINDER ENGINES (Series NH and NHS) have been developed by three innovations in Cummins design: (1) by increasing maximum operating speed from 1,800 rpm. to 2,100 rpm.; (2) by increasing bore and stroke from 4⅞x6 in. to 5⅛x6 in., which increases piston displacement from 672 to 743 cu. in.; (3) dual intake valves are employed to provide increased air supply needed to assure



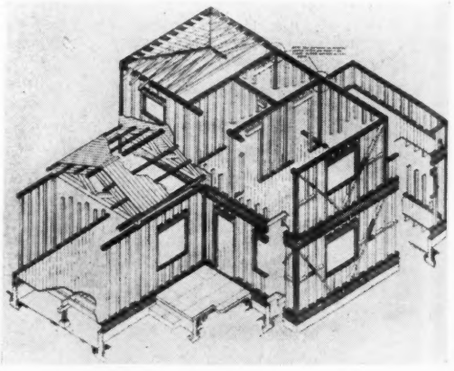
efficient combustion of additional fuel which engine requires in order to produce increased horsepower. Dual exhaust valves permit rapid exhausting of gases from the firing chamber. These improvements have produced additional horsepower without appreciably increasing engine weight or dimensions. In other respects, new series of diesel engines resembles those of the Cummins H line. Basic design and construction are the same. Overall dimensions of block remain unchanged and a high percentage of parts, including crankshaft, connecting rods, main and connecting rod bearings and many more may be used interchangeably in either series of engines. They also employ same four-stroke cycle principle of operation; the same Cummins fuel distribution and injection system and many of the same accessories. —**Cummins Engine Co., Inc., Columbus, Ind.**

★ ★ ★

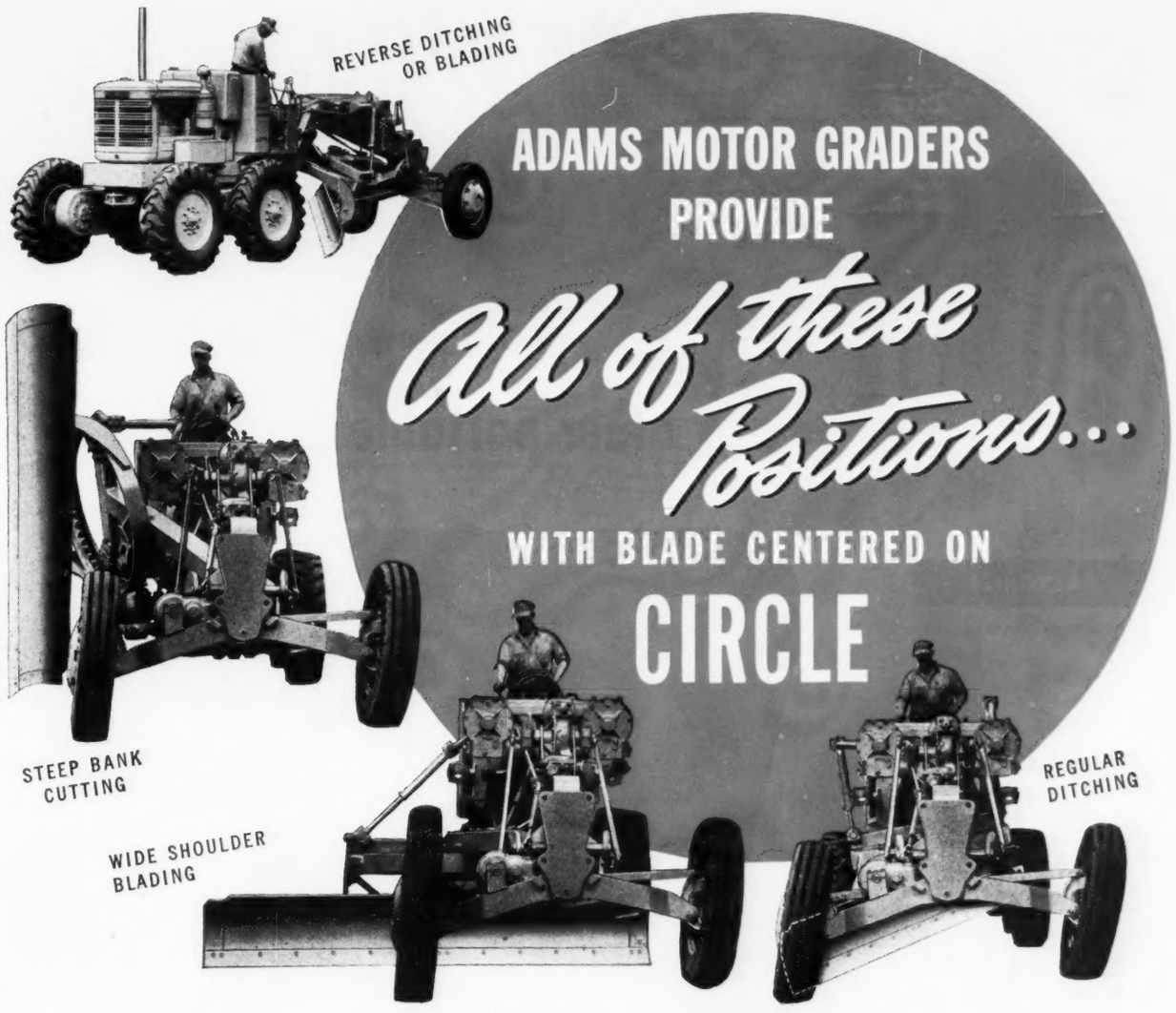
STRONGER SYNTHETIC RUBBER TRUCK TIRES, known as the "2200 denier' rayon type, are made by using stronger but fewer plies, this new construction, according to its developers, greatly reducing serious blow-outs which formerly placed a tire beyond possibility of repair. The 2200 denier rayon tire has twice the number of filaments twisted together as the 1100 denier, thus providing stronger individual rayon cords which reduce rupture spread and make it possible to repair injured tires by recapping. In addition, new construction is material aid to increased tire production because fewer operations are involved and materials and component parts are reduced. Stronger 8-ply tire can be produced in place of conventional 10-ply tire formerly made and similarly a better 10-ply replaces the standard 12-ply tire.—**United States Rubber Co., Rockefeller Center, New York City, N. Y.**

★ ★ ★

TERMITE CONTROL METHOD, claimed to save investments of builders from damage by subterranean termites for only 2 percent of the total cost of the structure, is illustrated in the framing detail drawing shown here. Purpose of Termitrol patent is to use pressure-treated lumber at those points in structure most vulnerable to attack and at the same time place this lumber in such strategic positions that any infestation that might occur in other parts will be isolated and confined to a small area that can be replaced with a minimum of labor and cost. Any approved pressure-treated lumber may be used provided it is treated with 8 lb. No. 1 A.W.P.A. creosote or approved equal.



"It is impractical to use pressure treated lumber throughout framing of an entire structure," said J. W. Gunn, inventor of this method, 'as the cost would be prohibitive. We have, however, perfected this method of affording maximum protection against subterranean termite, dry wood termite and dry rot attack so that every new building can use it economically'."—**Hollywood Termitrol Co., Inc., 2903 Beverly Blvd., Los Angeles, Calif.**



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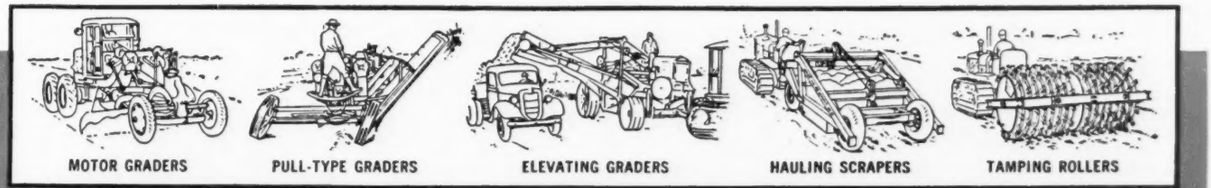

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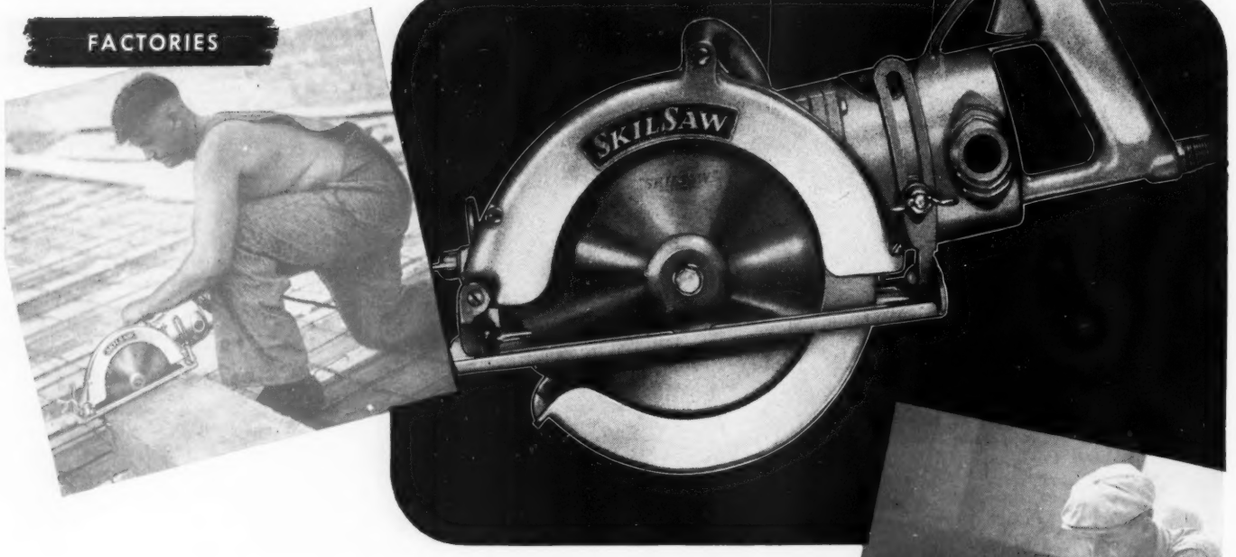

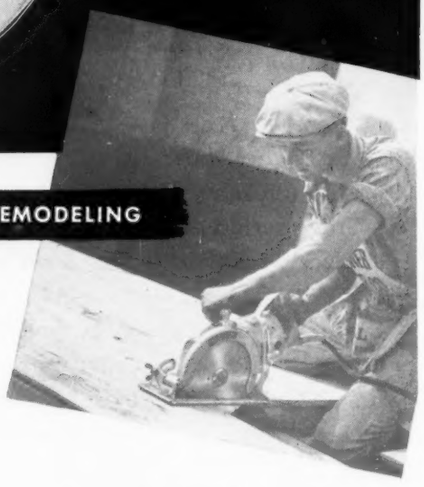

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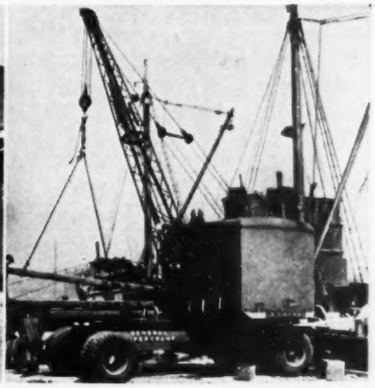

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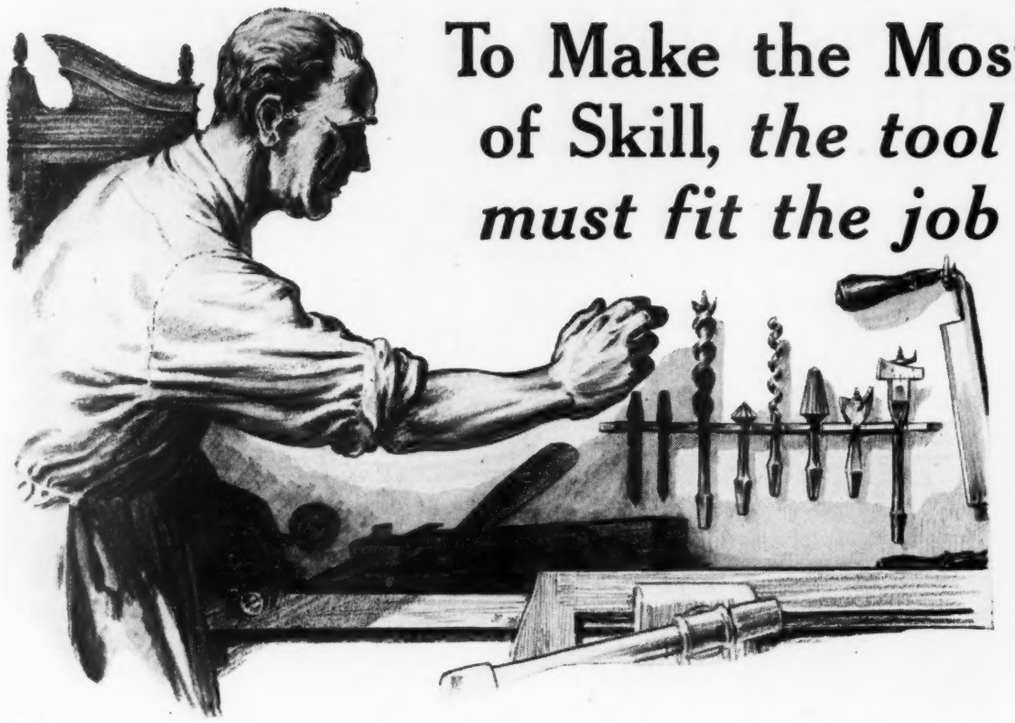

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Explosives, like bits, are designed for different jobs. In a bit it's type, shape, pitch of the cutting edge, hardness that are important—in an explosive it is strength, velocity, density, consistency, water resistance that distinguish one kind and grade from another. And, just as one drill isn't right for all types of material, so one explosive isn't right for every type of rock.

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				1⅛"	1¼"	1½"	1¾"	2"	4"	5"
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No. 3	65	7000	9500	154	127	91	66	50	13	8
No. 4	65	6800	9250	164	137	99	74	54	13	8
No. 5	65	6500	8500	177	147	104	77	58	14	9
No. 6	65	6350	8000	196	160	111	82	61	15	10
No. 7	65	5800	8000	210	173	118	88	67	15	10
Amodyn No. 2-H	65	10000	13000	143	118	80	60	46	11	7
No. 3-H	65	9500	12000	154	127	91	66	50	13	8
No. 4-H	65	9000	11000	164	137	99	74	54	13	8
No. 5-H	65	8500	10500	177	147	104	77	58	14	9
No. 6-H	65	8500	10000	196	160	111	82	61	15	10
No. 7-H	65	8000	10000	210	173	118	88	67	15	10

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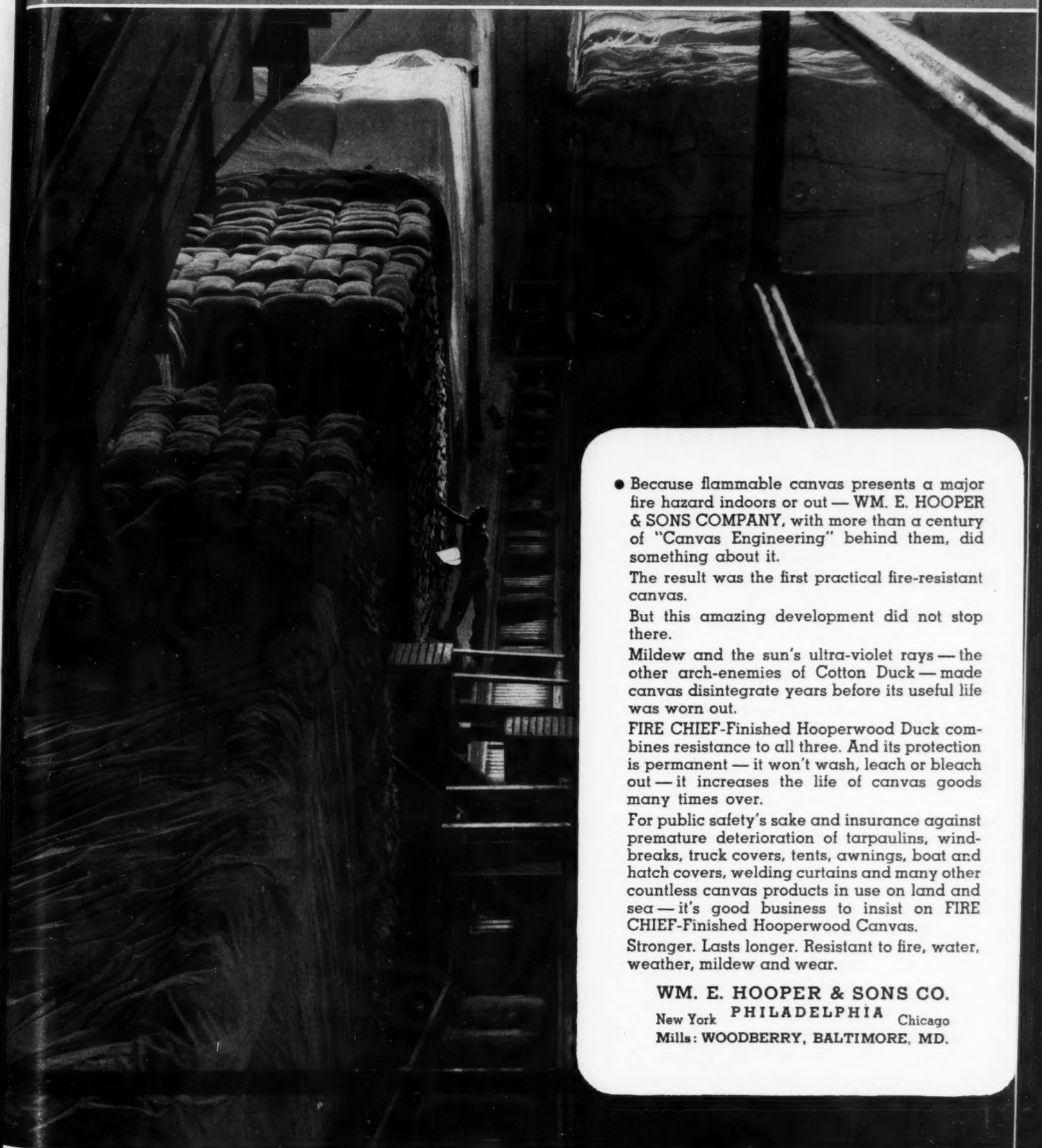


- Because flammable canvas presents a major fire hazard indoors or out — WM. E. HOOPER & SONS COMPANY, with more than a century of "Canvas Engineering" behind them, did something about it.

The result was the first practical fire-resistant canvas.

But this amazing development did not stop there.

Mildew and the sun's ultra-violet rays — the other arch-enemies of Cotton Duck — made canvas disintegrate years before its useful life was worn out.

FIRE CHIEF-Finished Hooperwood Duck combines resistance to all three. And its protection is permanent — it won't wash, leach or bleach out — it increases the life of canvas goods many times over.

For public safety's sake and insurance against premature deterioration of tarpaulins, windbreaks, truck covers, tents, awnings, boat and hatch covers, welding curtains and many other countless canvas products in use on land and sea — it's good business to insist on FIRE CHIEF-Finished Hooperwood Canvas.

Stronger. Lasts longer. Resistant to fire, water, weather, mildew and wear.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: WOODBERRY, BALTIMORE, MD.

• *Fire-Chief Finished* (PATENTED) •

HOOPERWOOD COTTON DUCK

There's a difference in HD oils

Comparison of Stanolube HD with other oils

OIL QUALITY	ENGINE TEST USED	Stanolube HD	Other HD Oils A	Other HD Oils B	Conventional Motor Oil C
Oxidation Resistance	36-hour Chevrolet Piston Varnish	9	9	8	5
	36-hour Chevrolet Engine Sludge	10	9	8	6
	500-hr. G.M. Diesel Piston Deposits	10	9	8	4
Detergency	Caterpillar 1-A Piston and Top Ring Deposit	9	9	8	4
	500-hr. G.M. Diesel Port Fouling	10	10	8	4
	500-hr. G.M. Diesel Filter Deposits	10	10	8	3
Bearing Corrosion Resistance	Caterpillar Hot Box	10	9	10	6
	36-hr. Chevrolet	10	9	10	6
	500-hr. G.M. Diesel	10	10	10	7
Load Carrying Ability	Caterpillar Scratch Test	10	10	10	6
Total Rating All Tests		98	94	88	51

Rating Explanation: 10—Excellent plus—Free from any deposits, corrosion, or scuffing. 9—Excellent. 8—Good. 7—Fair. 6 (or below)—Failure to pass —Heavy deposits, extensive corrosion or scuffing.

MANY OILS pass the tests that have been set up to determine an oil's suitability for use in Diesel engines or in gasoline engines under heavy-duty service. But that does not mean that all of these HD (heavy-duty) oils are the same.

Methods of testing HD oils are well established. They rate the qualities of an oil such as: oxidation resistance, detergency, corrosion, and other items listed in the first column of the table at right.

All HD oils are not the same because some oils excel in one or more qualities but are only passable in others. The table at right compares Stanolube HD's rating in all of these qualities with a number of other HD oils. The ratings given in the table are the result of many tests, under exactly similar conditions, for all the oils. Stanolube HD consistently rates *higher* in *more* of the qualities than any other tested oils.

What does this mean in actual service? Just this. Under present gasoline conditions and the heavy service demands on equipment, you need the greatest possible protection you can get to keep down varnish and other engine deposits, to guard against excessive wear on engine parts, bearing corrosion, or breakdowns caused by oil system failures. Stanolube HD gives this protection to a greater degree than other HD oils.

Find out how this greater protection can cut maintenance and replacement costs in your fleet. A Standard Oil Automotive Engineer can help you make this test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

This table above compares Stanolube HD's rating in heavy-duty oil qualities with (A) the best of 10 other HD oils that passed the tests, (B) the lowest rated oil of the 10 that passed and (C) the rating of a high quality regular (not HD) motor oil. Such an oil is not usually subjected to these tests and is included here merely to indicate the severity of the tests by this comparison.

heat-proofed
Stanolube HD

Buy more War Bonds

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

BUILD BETTER *Postwar* VACATIONLAND ROADS!

When gasoline rationing becomes a memory and the call of the open road can be answered, the new and improved highways that must be built through remote vacationlands will provide many profitable jobs for contractors with the proper equipment. In the Cedarapids line of portable plants there is just the size and type to fit every aggregate production requirement. The Junior Tandem is a typical example, has plenty of belt capacity to handle all kinds of pit conditions, ample extra screen capacity for those tougher screening jobs, and the extra secondary crushing capacity for the production of either fine or coarse aggregate. The entire plant is mounted on one steel truck chassis equipped with pneumatic tires, ready to move to the mountains, parks, or forests from one job to another. Let your Iowa dealer tell you about the profit opportunities you can have with Cedarapids equipment.

Cedarapids

Built by IOWA

THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS
STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS—TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

ARMY E NAVY

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa

You'll Never Have to Run an Ad Like This as Long as There's

SISALKRAFT

WANTED

We are in the market for a strong, tough, moisture-proof, all-weather paper which will materially reduce our job costs . . . a paper which has proved itself "tops" as a concrete curing and protective agent . . . one that eliminates all doubt as to the curing results. It must be a scuff-proof paper, capable of standing plenty of abuse and protect against drippings and debris. It must be time-tested and generally accepted by engineers and architects. Address your replies to "Wide Awake Contractors," Anywhere, U.S.A.

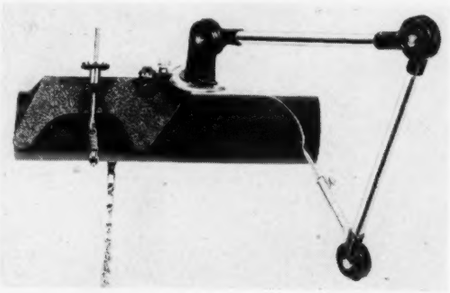
Here are a few of the Many Sisalkraft Uses

Cover and protect equipment against weather . . . cover stock piles . . . closing in . . . cover brick courses . . . lining construction shanties . . . cover sand cushion under terrazzo . . . over sub-fills . . . for all-around building protection.

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

PROTRACTORS for scribing for cutting on any angle to ½ deg., pipe, structural shapes and flat sheets, are made in two stock models, three sizes. Model illustrated scribes circumference of pipe 3 to 18 in. in diameter. In a few seconds it may be placed on the pipe parallel to center line, leveled by built-in spirit level, locked in place with spring



chain, adjusted to desired angle by 180-deg. scale and scribing completed. Made of precision-machined cast bronze alloy and steel tubing. Joints are large in diameter and contain special fiber bearings which hold correct tension and maintain positive alignment. Marking arm is rigid throughout travel. Another size of this model marks pipe 12 to 36 in. dia. The Junior Trumark protractor marks pipe or rod ½ to 3 in. dia. For use on flat surfaces, channel iron T or I structural shapes, protractor is set up as on pipe, or held square to any edge or corner. Plumb bob indicator and spirit level show any degree of angle from a horizontal plane.—**Tru-Line Corporation, 759 Venice Blvd., Los Angeles 15, Calif.**

Until the Shooting Ends....

. . . THE BYERS CRANE YOU NEED IS BEING SHIPPED TO AN OUTFIT THAT NEEDS IT MORE THAN YOU DO.

In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.

BYERS CRANES AND SHOVELS
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

Cement.. Steel.. Stone.. Sand.. Gravel..
Coal.. Machinery.. Brick.. Block..
Bull-Dozers.. Lumber.. Poles...
Timber.. Cranes.. Power Shovels
Cable.. Scrapers

NAME the LOAD

THERE'S A FRUEHAUF TRAILER TO HAUL IT! . . . . . .

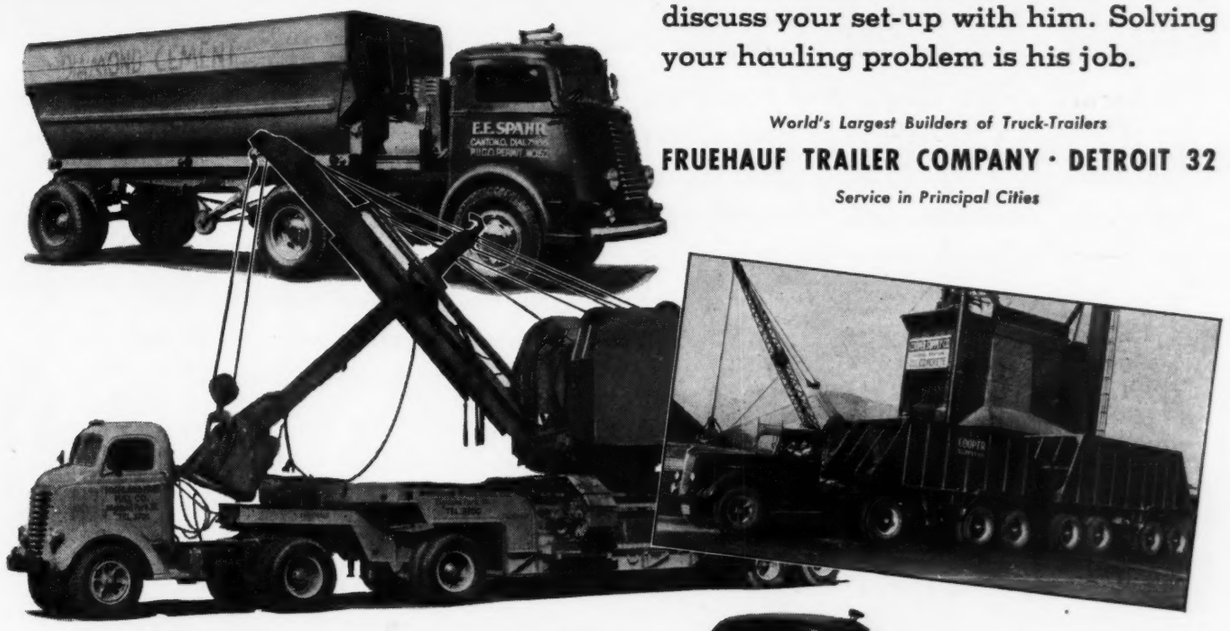
HERE are but a few examples of the engineering skill and manufacturing experience you can expect Fruehauf to apply to whatever hauling problem you may have. There is no substitute for such experience, as Fruehauf users will tell you.

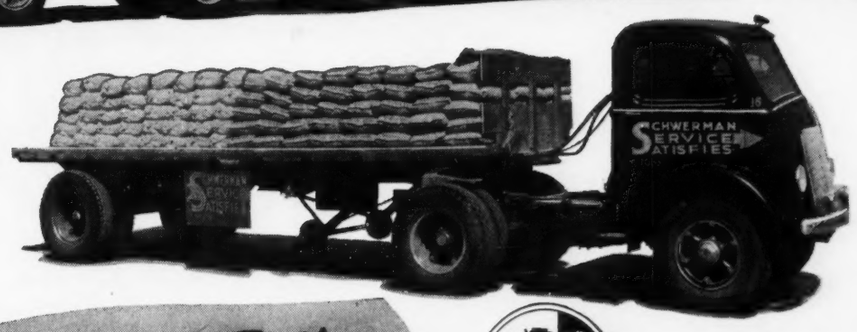
Today is not too soon to call in the nearest Fruehauf representative to help you. It generally pays dividends to discuss your set-up with him. Solving your hauling problem is his job.

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY · DETROIT 32

Service in Principal Cities





NATION-WIDE FACTORY-BRANCH TRAILER SERVICE

Over 50 Fruehauf Factory-Branch service stations are strategically located all over the nation. Keeping Trailers on the road is a fundamental Fruehauf policy.

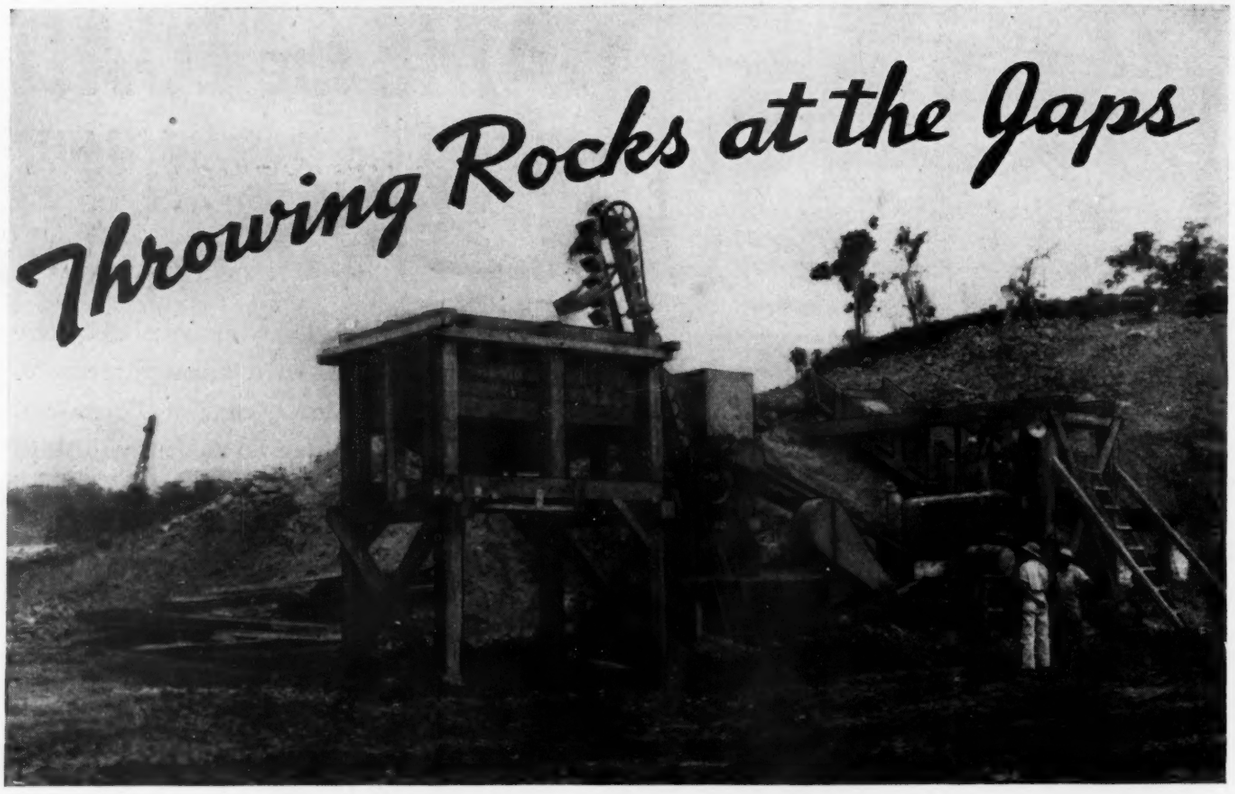
Fruehauf Trailers

Reg. U. S. Pat. Off.

A TRUCK IS LIKE A HORSE
IT CAN PULL MORE THAN IT CAN CARRY

"Engineered Transportation"

Throwing Rocks at the Japs

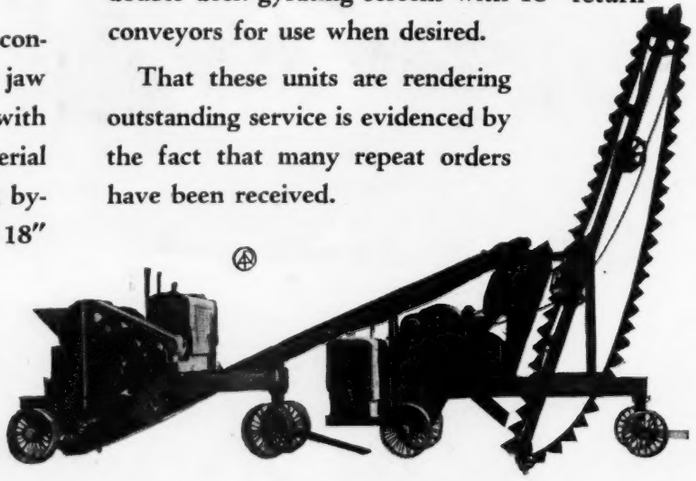


As fast as the Japs are pushed back from South Pacific Islands, air bases are established. Knowing there would be need for a single, highly mobile rock crushing plant, Universal engineers — early in the war — designed such a plant. Scores of them are in use from Australia to almost the gates of Tokyo.

Designated our No. 522-Q, these plants consist of a 20″ x 36″ Series "SL" primary jaw crusher mounted on a steel-wheeled truck with power unit and conveyor. Crushed material from the primary is fed to a grizzly with by-pass placed over the truck-mounted 30″ x 18″ secondary roll crusher, oversize chuting to the roll crusher and throughs going to a bucket elevator boot. Elevator discharges into bin made of native materials to load trucks for hauling to landing strips under construction.

All the plants are provided with 3′ x 8′ double deck gyrating screens with 18″ return conveyors for use when desired.

That these units are rendering outstanding service is evidenced by the fact that many repeat orders have been received.



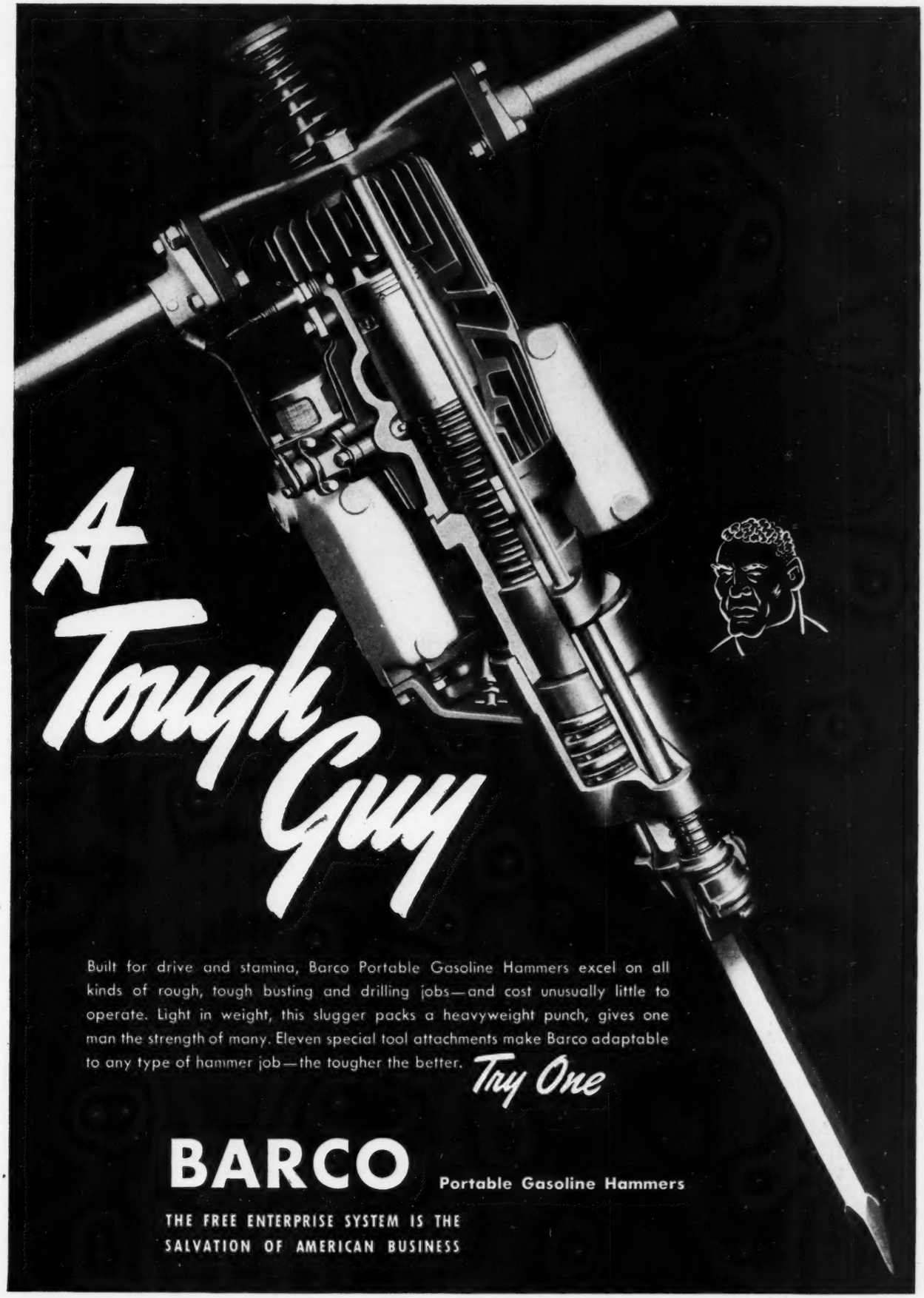
UNIVERSAL ENGINEERING CORPORATION

327 8th Street West, Cedar Rapids, Iowa

ARMY E NAVY

UNIVERSAL

ROCK AND GRAVEL CRUSHERS, CRUSHING ROLLS, HAMMER MILLS, COMPLETE CRUSHING AND SCREENING PLANTS, WASHING PLANTS, ASPHALT PLANTS, SPREADERROLLERS.


A Tough Guy
Built for drive and stamina, Barco Portable Gasoline Hammers excel on all kinds of rough, tough busting and drilling jobs—and cost unusually little to operate. Light in weight, this slugger packs a heavyweight punch, gives one man the strength of many. Eleven special tool attachments make Barco adaptable to any type of hammer job—the tougher the better.
Try One
BARCO
Portable Gasoline Hammers
THE FREE ENTERPRISE SYSTEM IS THE SALVATION OF AMERICAN BUSINESS

BARCO MANUFACTURING COMPANY, NOT INC., 1128 Winnemac Ave., Chicago 40, Ill. • In Canada: The Holden Co., Ltd, Montreal, Can.

"Won't Mrs. DelMedico be surprised?"

"What an improvement!" writes William L. (Red) Ryan, operator for the Hunnewell Trucking Co., Inc., of Boston, Mass. "Your Timken Easy-Power Shift is really in the groove. Because there is no loss of speed in shifting I can pass most other trucks on the grades. I am now making the fastest time I've ever made on this run . . . Man alive! That 2-Speed Axle with Easy-Power Shift sure makes a difference. Won't Mrs. DelMedico be surprised when I pull into Boston away ahead of time?"

SURPRISE: Mrs. M. S. DelMedico, Terminal Mgr. for Hunnewell, greets Driver Ryan at the end of his run. Mrs. DelMedico is one of the few women truck dispatchers in Massachusetts, and has ably demonstrated her ability. Of the Timken Easy-Power Shift, she writes, "The Easy-Power Shift effects a big saving in time, over trucks with conventional shift, and enables us to handle more goods every 24 hours."

RESULT: The savings in gasoline, time, and engine wear, made possible by the Timken 2-Speed Double Reduction Axle with Easy-Power Shift, have been a great contribution to the efficiency of the Hunnewell operation, and have a direct bearing on operation ratio, according to J. F. Robinson, president . . . The Hunnewell Trucking Company has been complimented by the Office of Defense Transportation for outstanding utilization of vehicles, handling of property and maintenance of equipment.

AXLES ARE IMPORTANT! For improved performance, lower maintenance costs, longer life — select a vehicle with Timken Axles . . . backed by 39 years' experience serving the leading manufacturers of all types of commercial vehicles.

The Accepted DTA Standard

TIMKEN AXLES

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT 32, MICH.
WISCONSIN AXLE DIVISION • OSHKOSH, WISCONSIN

P&H

HOW TO GET ADDED VALUES-

Freedom from Crawler Troubles. P&H's true rolling crawlers will save you time and trouble for years to come. Operating on the true roller chain principle, crawler belts roll smoothly with double sprocket drive. All driving wear is put on renewable pins; high replacement costs are eliminated.

Greater Strength with All-Welded Construction of Rolled Alloy Steels. Both upper and lower structures are all-welded . . . stronger, more rigid, more rugged. Entire units are jig-drilled and machined, assuring proper permanent alignment of shafting and bearings — interchangeability of repair parts. Greater strength and rigidity will save you many a repair bill.

P&H excavators are built in sizes up to 6 cubic yards capacity with gasoline, Diesel or electric power

Smooth Hydraulic Control — Easier on Men and Machines. This proved low pressure system with independent controls gives you instant response — smoother, easier, with less effort. Wear and loosening common to shafts, reach rods, pins and toggles are eliminated. Fewer parts mean less wear, less maintenance. These are but a few of the added values that make P&H Excavators a more profitable investment.

P&H

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4494 West National Avenue,
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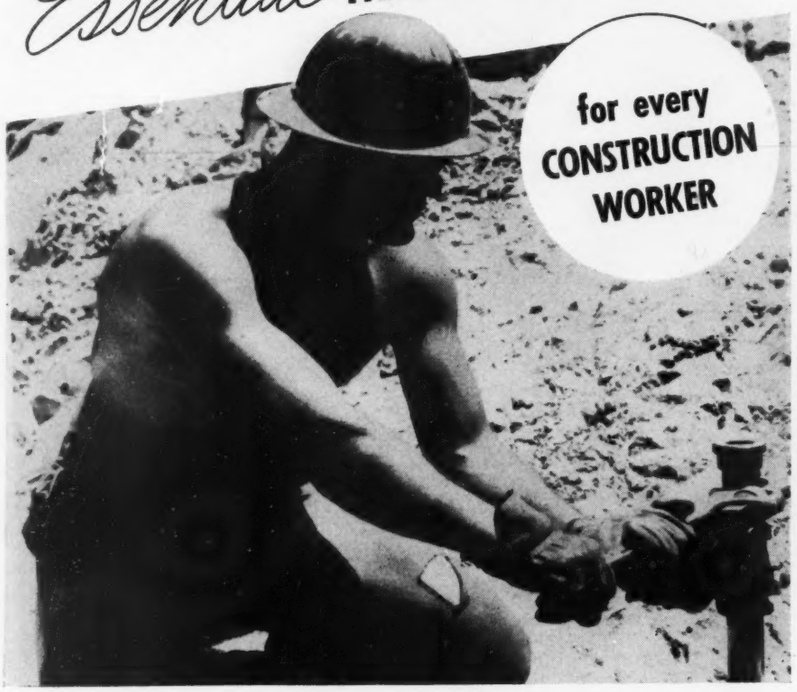
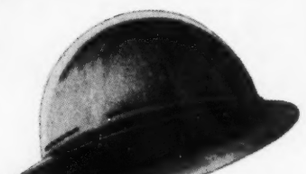
HARNISCHFEGER
CORPORATION

EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

Essential HEAD PROTECTION—



M·S·A *Skullgards*



Wherever men work on construction projects, the danger of head injuries is always present. Guard your men against these head hazards with M.S.A. Skullgard Protective Hats—famous for years for their tremendous resistance to fracture, yet Skullgards are comfortable, lightweight and well-balanced.

M.S.A. Skullgards, built of high-pressure molded laminated bakelite, are tough and durable; unaffected by rain, sun, perspiration, oils or greases. They provide a sturdy shield against falling and flying objects. Descriptive bulletin on request.

MINE SAFETY APPLIANCES CO.
BRADDOCK, THOMAS AND MEADE STREETS
PITTSBURGH 8, PA.
DISTRICT REPRESENTATIVES IN PRINCIPAL CITIES

MOTOR ATTACHMENTS FOR MANUALLY-OPERATED JACKS are made in two types, Duff and Norton. Both types are easily attached, making possible use of portable shop motors of 1½- to 2-in. drill size to power jacks for lifting, lowering, pushing or pulling. No. 4085 Duff attachment is

designed for use with Duff-Norton governor-controlled jacks and may be attached or removed, as desired. No. 4086 is permanent model and is bolted to jack. Norton attachment (No. 571-MA) is used with Duff-Norton self-lowering, speed-controlled jacks and is quickly slipped on jack pinion shaft after removal of ratchet case and gear. **—Duff-Norton Co., Pittsburgh 30, Pa.**

A 42 LB. BABY THAT DOES THE WORK OF 10 MEN

For construction involving heavy cutting, for clearing roads, or any work in sawing or felling trees or heavy timbers, the new Lombard air-driven saw is the baby that does the work of ten men.

Weighs only 42 pounds — 10% less than other makes. Goes through soft wood at an average of about an inch per second, hard wood in about double this time. Operates from a standard 105 cu. ft. compressor. 24 and 36 inch blades.

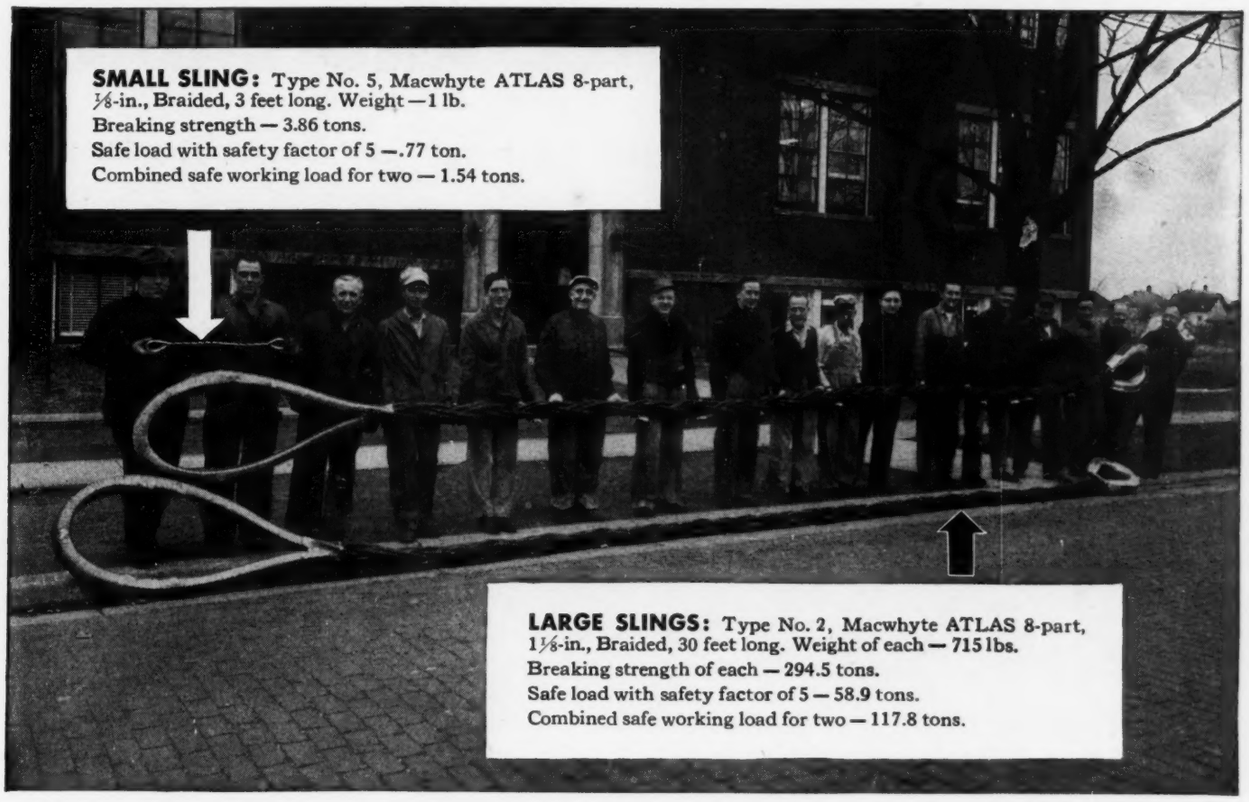
Available also in 3 h.p., 60 cycle, 220 volt electric model.

Write for Literature *Dealer Opportunities*

LOMBARD
GOVERNOR CORPORATION
ASHLAND, MASS.

WE MAKE 'EM LARGE OR SMALL!

Here is a striking example of the different size slings made by Macwhyte


SMALL SLING: Type No. 5, Macwhyte ATLAS 8-part, ⅜-in., Braided, 3 feet long. Weight—1 lb.
Breaking strength — 3.86 tons.
Safe load with safety factor of 5 —.77 ton.
Combined safe working load for two — 1.54 tons.
LARGE SLINGS: Type No. 2, Macwhyte ATLAS 8-part, 1⅛-in., Braided, 30 feet long. Weight of each — 715 lbs.
Breaking strength of each — 294.5 tons.
Safe load with safety factor of 5 — 58.9 tons.
Combined safe working load for two — 117.8 tons.

Macwhyte Slings Made in All Sizes to Meet Your Lifting Needs!

Whatever the load, you can get the right size Macwhyte Sling to handle it quickly, easily, safely. We can make one sling or any number of identical slings for you.

Many companies have adopted Macwhyte Slings as standard sling equipment. They anticipate their needs and place blanket orders, with shipments at regular intervals, insuring delivery of slings when they are required.

Buy more War Bonds — hold what you have!

SEND FOR SLING LITERATURE!

You can avoid production delays by ordering Macwhyte custom-built Slings in time to meet your needs. Ask for recommendations, prices and delivery. Mail your request for more information on your company letterhead. We will send you complete catalog and pictorial literature.

MACWHYTE COMPANY

2941 FOURTEENTH AVENUE, KENOSHA, WISCONSIN

Manufacturers of the CORRECT wire rope for your equipment

Left-&-Right Lay Braided Slings · Aircraft Tie-Rods
Aircraft Cable · "Safe-Lock" Swaged Terminals
Manufactured under U.S. and Foreign Patents

Mill Depots: New York · Pittsburgh · Chicago · Ft. Worth · Portland Seattle · San Francisco · Distributors throughout the U.S.A.

Member National Safety Council

NO. 790-S

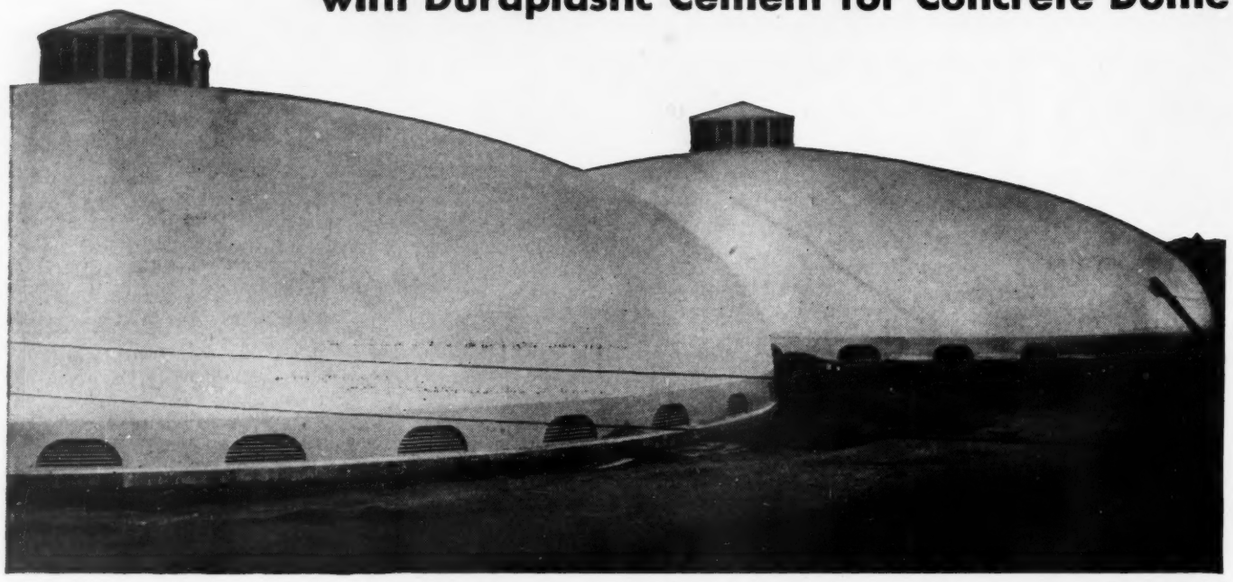
RIGHT-LAY **MACWHYTE SLINGS FOR INDUSTRY** LEFT-LAY

"Lifting safety to new heights"

Macwhyte Wire Rope Slings are made to meet the capacity of any crane built

CONTRACTOR SAVES BOTH TIME AND LABOR

with Duraplastic Cement for Concrete Dome



Sewage disposal plant, Hibbing, Minn. To place the Duraplastic concrete for the second dome required only half the men and a third less time than on first dome, made with regular cement. Roberts & Schaefer Co., designers; J. C. Taylor, architect; Charles Foster, consulting engineer; E. W. Coons Co., Inc., contractor.

WHILE only recently announced, six years of gratifying field performance are back of Atlas Duraplastic, the new air-entraining portland cement that makes better concrete at no extra cost. Since 1939 it has been used for over 2½ million sq. yds. of paving and for a variety of building jobs throughout the country.

Because it makes concrete more workable, reduces segregation and bleeding, and spreads, screeds and finishes more easily, Duraplastic cement sometimes saves both time and money, as illustrated by the following example.

At the Hibbing, Minn., sewage disposal plant two trickling filters are covered with thin-shell concrete domes of similar dimensions. The contractor states that the thin shells (3½″ to 6″) and the heavy reinforcing required great care in placing the concrete.

ON THE FIRST DOME, built with regular cement, he used 28 men, additional foremen, and three days to place the concrete;

ON THE SECOND DOME, constructed with Duraplastic cement, there was considerably less segregation of the aggregate and improved plasticity. As a result, 13 men did the job of placing in two days.

Atlas Duraplastic cement complies with ASTM specifications, sells at the same price as regular cement, and makes better concrete at no extra cost.

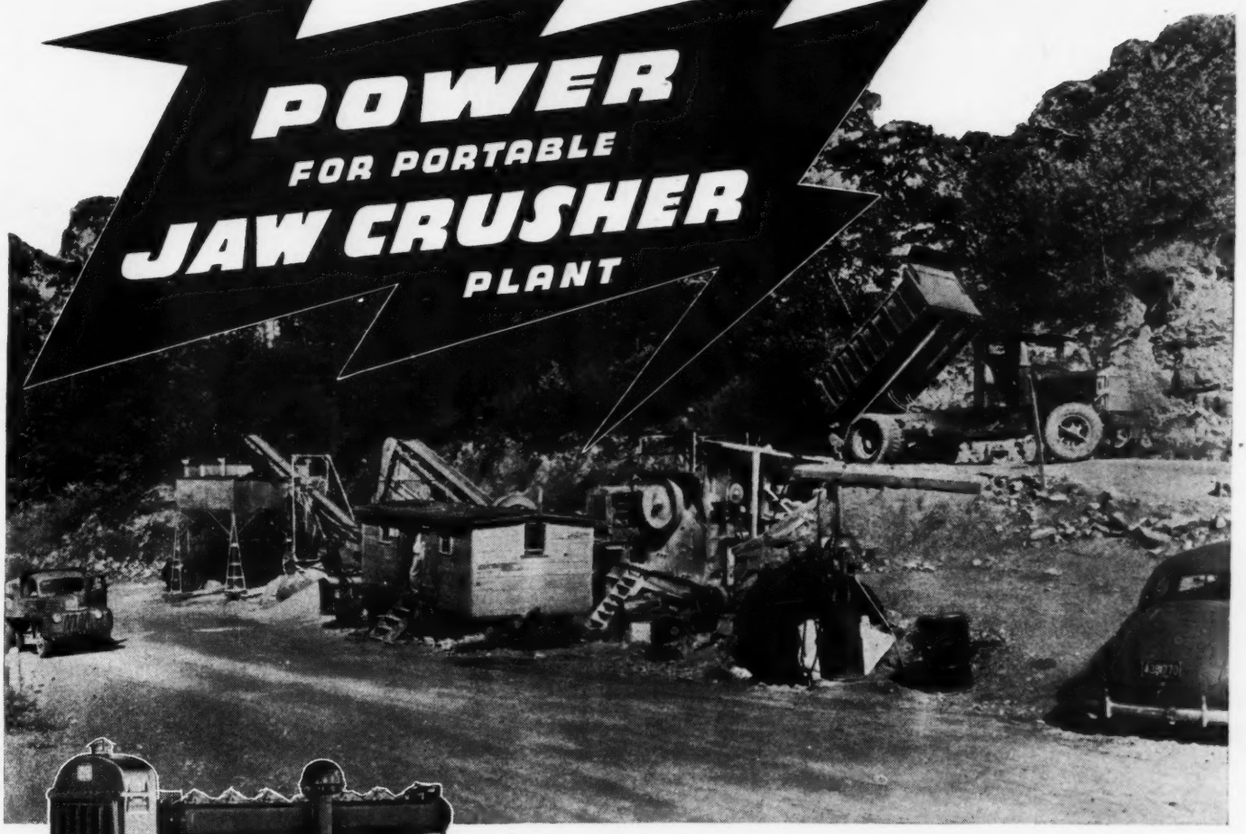
Send for booklet on Duraplastic cement. Write to Technical Service Bureau, Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 135 East 42nd Street, New York 17, N. Y. Offices: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco. CM-D-13

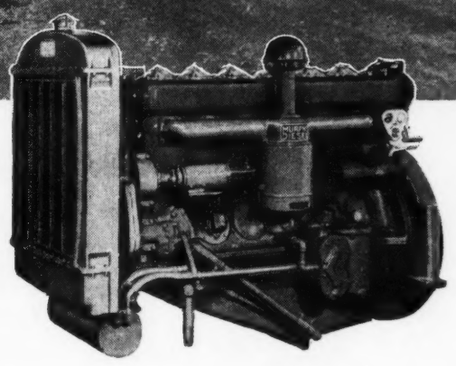
ATLAS DURAPLASTIC

TRADE MARK REG. U. A. C. CO.

The Air-Entraining Portland Cement That Makes Concrete More Durable and More Plastic

POWER FOR PORTABLE JAW CRUSHER PLANT





Model ME-6, 5¾ x 6½, 6 cyl., 160 H.P. Murphy Diesel, powering Universal Engineering Company's Portable Jaw Crusher, owned by Art Overgaard, Elroy, Wis.

MURPHY DIESELS give a good account of themselves wherever called upon to power machinery for the construction industry, because they are engineered for the rugged service demanded from rock crushers, hoists, sand and gravel plants, pumps, excavating and loading machines, locomotives, logging and lumber plants, mines, barges, tugs, work boats . . . for heavy electrical loads . . . and for other heavy-duty jobs which they do economically and well.

They are compact, relatively light in weight, simple in construction, with plenty of reserve power. Operating and maintenance costs are low . . . no premium-priced fuel required . . . more power, more profit are assured. Write for bulletin.

ARMY E NAVY

★ *Buy U. S. War Bonds* ★

MURPHY DIESEL COMPANY
5339 West Burnham Street
Milwaukee 14, Wis., U. S. A.

More Power

MURPHY DIESEL

Reg U.S. Pat Off.

More Profit

Engines: FROM 90 to 215 HP
Generators: FROM 60 to 115 KW

"FIELD-PROVEN *Power*"

102

Only HERCULES Delivers All These Features

Bigger payloads unloaded faster—less maintenance—greater profits—these are the advantages of Hercules construction . . . advantages that make Hercules dump bodies worth waiting for!

While you're waiting, your Hercules distributor can be of service, keeping your present equipment in top working order. He has the mechanical facilities, the replacement parts and the trained personnel needed to maintain your overworked equipment.

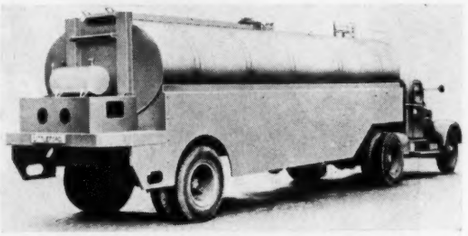
HERCULES

DUMP BODIES AND HYDRAULIC HOISTS
SPLIT SHAFT POWER TAKE-OFFS • COAL CONVEYORS

Buy War Bonds . . Invest in America's Future and Your Own

HERCULES STEEL PRODUCTS COMPANY . . . GALION, OHIO

BITUMINOUS SUPPLY TANK for hauling bituminous materials from source of supply to pressure distributor eliminates use of trailer frame, has a self-supporting tank and is made in semi-trailer



models in capacities ranging from 1,250 to 4,000 gal. Frameless construction gives better load distribution and lower center of gravity. Two models, No. 102 with vaporizing torch type burners and No. 103 with atomizing low pressure coil-less burners, are available.—**Littleford Bros., 443-57 E. Pearl St., Cincinnati, Ohio.**

★ ★ ★

FOR STOPPING LEAKS IN CONCRETE a new material called "Seep-Seal" may be mixed with cement and inserted in cracks or holes while water is actually gushing through and it is claimed that seepage will be stopped in 2 min. Subways, mine shafts, reservoirs, foundations and other underground concrete structures can be kept virtually leak-free with this material, according to its manufacturers. It may also be used for damp-proofing walls where mild seepage is encountered.—**Rock-Tred Corp., 629 W. Washington St., Chicago 6, Ill.**

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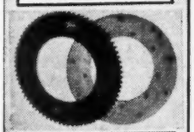

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Cone Type Clutch Facings

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The great success of the SEAMAN handbook "Soil Stabilization Methods" has led us to feel that all new material should be published immediately rather than held for new editions of the book itself. So, Seaman engineers plan to issue new information in brief bulletin form; not regularly; — only as occasion demands.

Please let us know in what types of work you are interested? We suggest you clip the check list below and mail it to us. Bulletins with specific news or information covering the indicated fields will be sent you. And of course there is no obligation implied in availing yourself of this service.

Above — Aerating bituminous mix to hasten set.

Below — Clearing shoulders, — and preparing seed bed for grass.

In addition to Bulletin C-24 — "Soil Stabilization Methods" — Seaman is publishing short supplementary bulletins containing the most up-to-the-minute engineering information from airfield and highway construction work. Ask for Series "Fresh From the Field."

C-107

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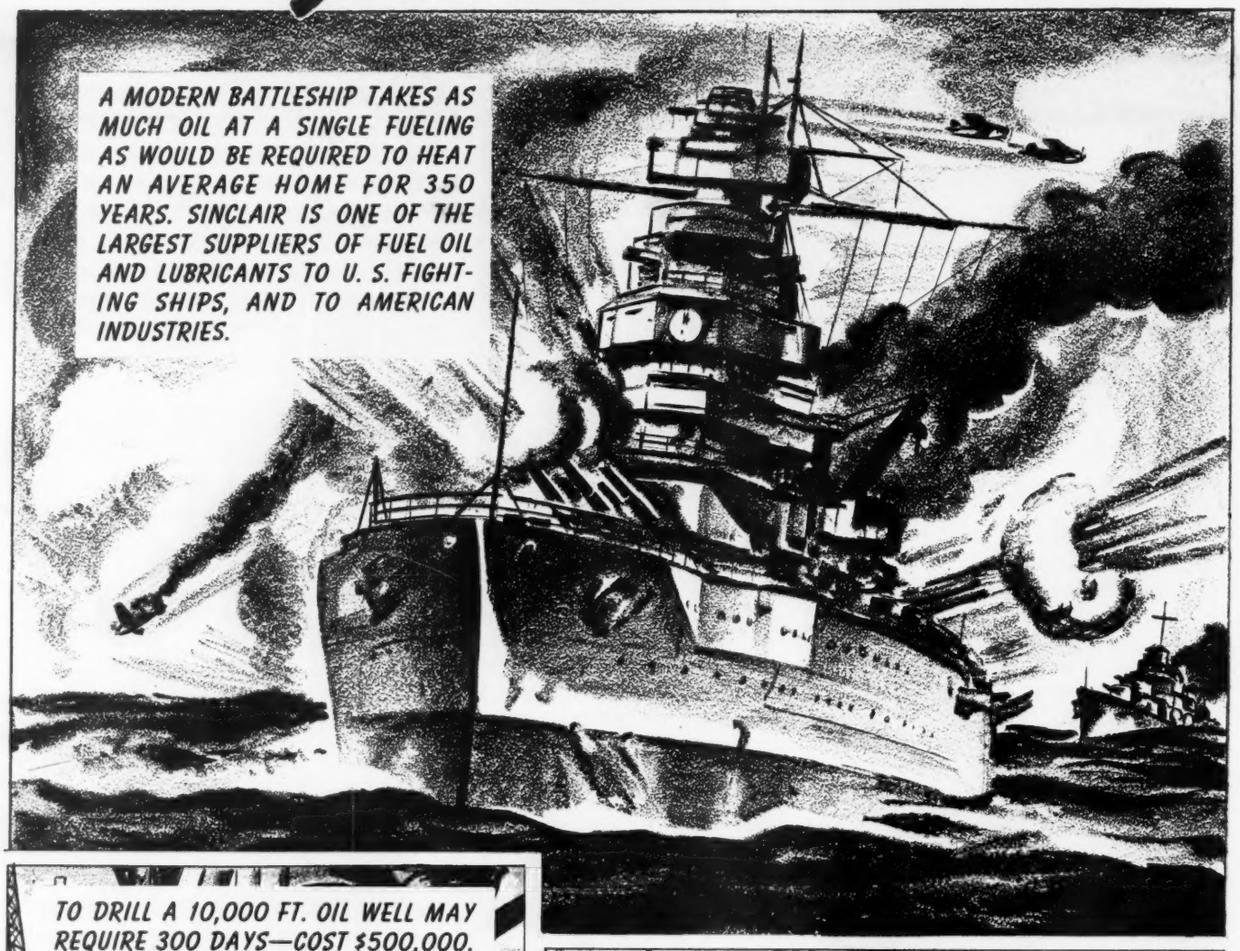

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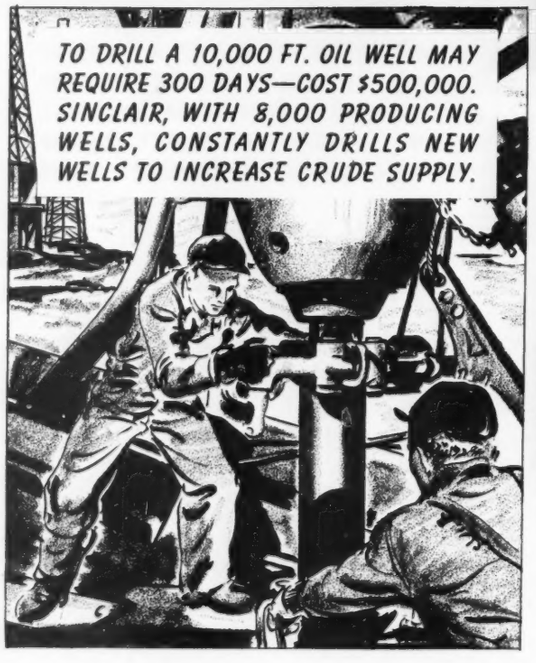

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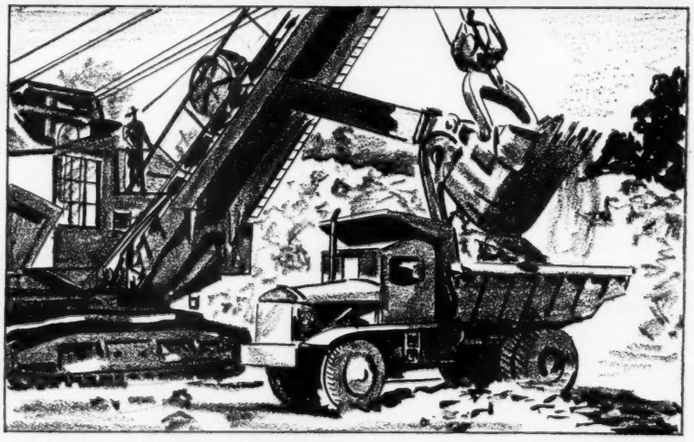

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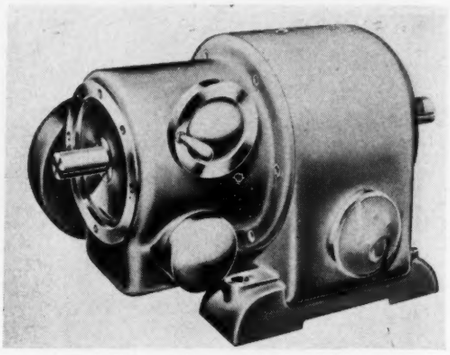

terest to users of medium and higher horsepower motors. Advantages: (1) Compact design reduces space requirements; (2) lower weight; (3) assurance of positive drive; (4) wide range of sizes and speed ratios—drives from 1 to 100 hp., and higher, variable speed ratios ranging from 1¼ to 1 to 70 to 0 are available; (5) finer control—low gear ratios are available to give close accurate control when desired.—**Lombard Governor Corp., 60 E. 42nd St., New York 17, N. Y.**

★ ★ ★

WATERPROOFING MATERIAL, acid and alkali-proof, for conditioning damp walls, foundations, tunnels and iron pipes in underground passages, is said to be flexible and elastic and not to become brittle and crack in cold temperature nor ooze nor soften in temperatures up to 125 deg. F. Product is a comparatively slow drying material which has good brushing properties.—**The Dolphin Paint & Varnish Co., 922 Champlain St., Toledo 3, Ohio.**

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NEWLY DESIGNED PASSENGER CAR TIRE, known as the Mud-Snow Silvertown, is now being produced in the 6.00-16 four- and six-ply, 6.25/6.50-16 six-ply and 5.25/5.50-17 four-ply, and is offered for combination service either on improved highways or off-the-road with tread engineered to impart maximum traction on slippery snowbound highways, out of deep holes and through rutted mud-clogged side roads and lanes. Advantages: (1) Designed for use both on and off highway; (2) non-directional tread gives equal traction forward or backward; (3) super-strong carcass provides greater strength and durability during tire life; (4) self-cleaning—wide, open tread does no clog with mud or snow or pick up gravel or stones.—**The B. F. Goodrich Co., Akron, Ohio.**

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● Major machinery units on the new Koehring 205 are quickly and easily removed. No need to disconnect other assemblies when only the drumshaft, or the boom hoist, or the traction gear case, needs attention. Lift out only the part you want for convenient bench work. For major overhauls, the entire machinery support frame lifts off . . . as a unit . . . with all the machinery that's attached to it.

Typical of the quickly removable major machinery units of the new Koehring 205 is the independent traction unit, the assembly that makes possible the 205's independent travel while swinging, hoisting, raising or lowering the boom. The entire assembly can be lifted out without disconnecting any of the other main operating units.

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205
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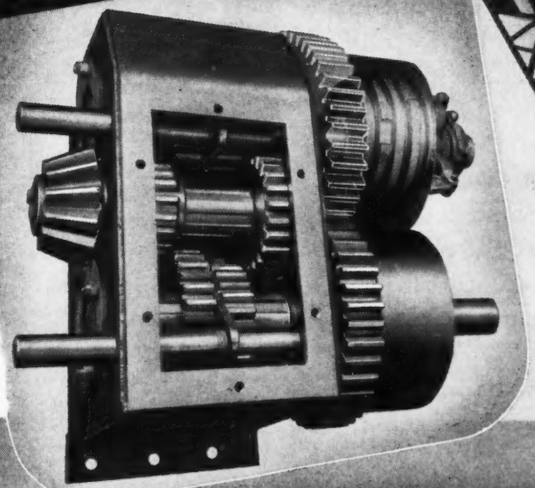

Orders Accepted Now for Postwar Delivery

KOEHRING HEAVY DUTY

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HEAVY-DUTY CONSTRUCTION EQUIPMENT

Leading Load Carrier *on Leyte*

From LST to GMC is the word of the day in this supply scene from the Leyte Beach. Acme News photo.

GMC Has Built More than 475,000 Like It!

The conquest of Leyte, accomplished in but 68 days, is a splendid tribute to the courage and efficiency of American fighting forces, not only on battle lines, but on supply lines as well. The photograph above tells part of the story of the gigantic job of supply. An even better understanding is provided by War Department estimates that overseas Armies are furnished with 700,000 different items of equipment and supply . . . a ton a month for each man in combat. In the Leyte campaign . . . as at Salerno and Saipan, New Guinea and Normandy . . . the leading load carrier from beach to battle line was the Army's leading transport truck, the GMC 2½ ton "six-by-six." With its powerful "270" engine driving through all six wheels, it has proved to be as much at home in Pacific sand and swamp as in European mud and mire!

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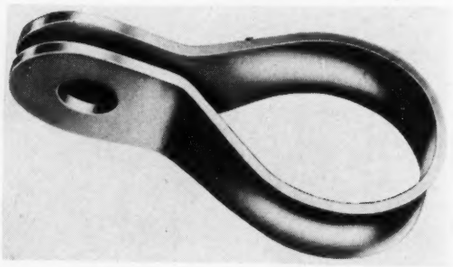
NEW CLEVIS RING that fits any standard cable terminal is made to exact dimensions from alloy steel carefully formed to retain the full strength



qualities of the steel. Each ring is cadmium plated. Tests have shown, according to its manufacturers, that the strength factor of this ring is in excess of the cable with which it is used.—**Poulsen & Nardon, Inc., Terminal Box 2398, Los Angeles 14, Calif.**

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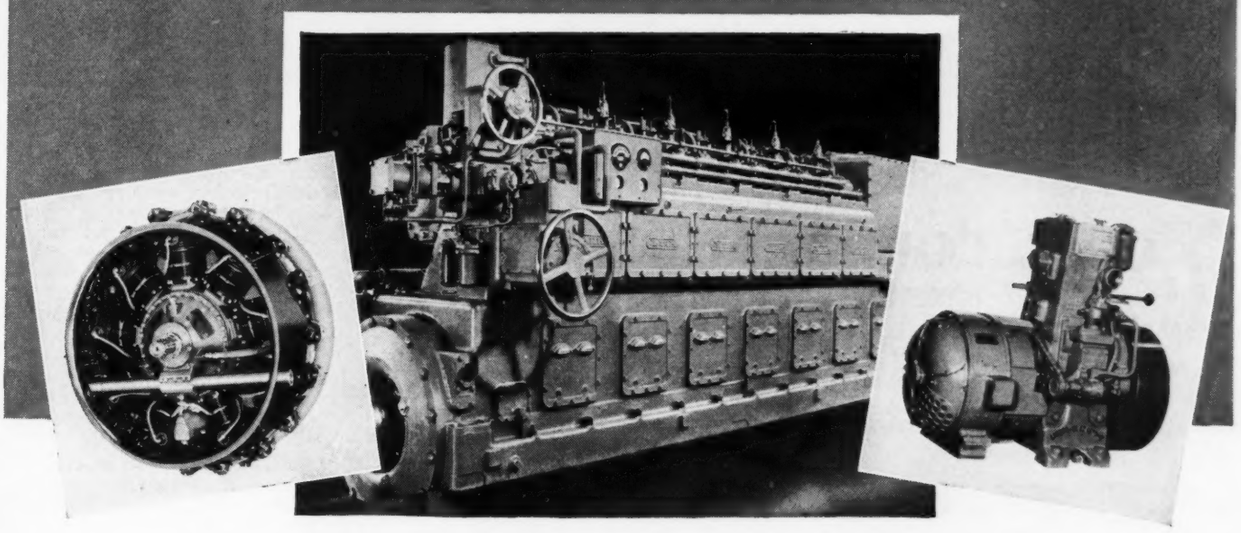

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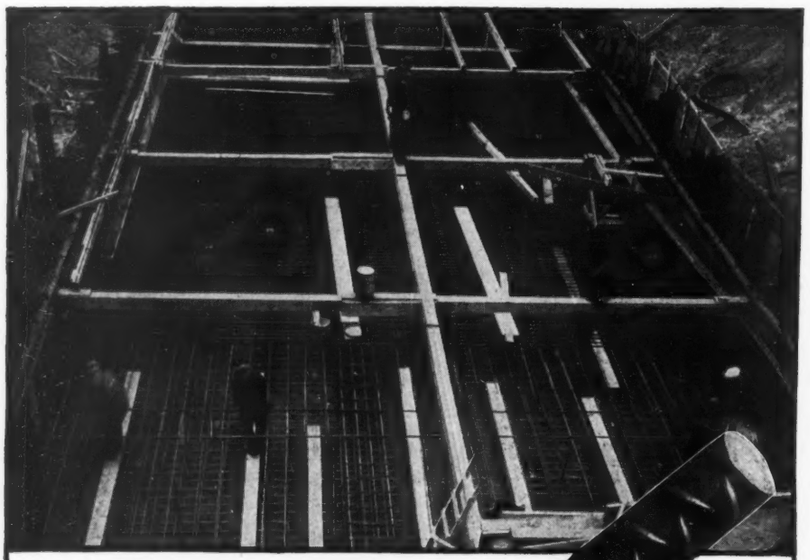

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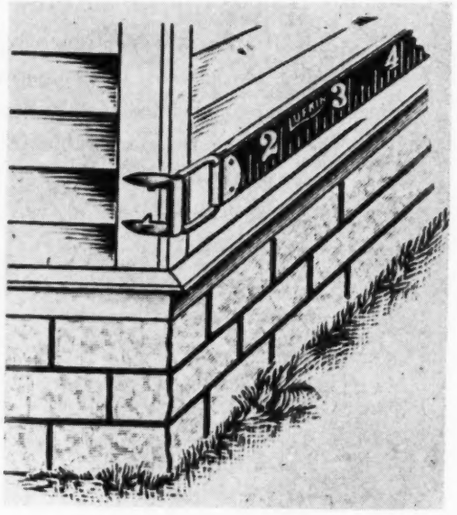
NEW TREAD DESIGN FOR SYNTHETIC RUBBER TIRES is claimed to retard growth of tread cracks and to reduce running temperatures of tires as much as 50 deg. Retarding of crack growth is accomplished by altering conventional, continuous

tread ribs to include terminal at approximately every half inch in crevice between ribs where damaging breaks or cracks usually originate. Reduction of heat is brought about by ventilated shoulder on each tire instead of the usual unbroken rib-type shoulder. Truck tires with the new "Hi-Miler-S Rib" tread are now in production in entire range of sizes for all over-the-road uses.—**The Goodyear Tire & Rubber Co., Akron 16, Ohio.**

★ ★ ★

HOOK RING on 3/8-in. wide steel tapes will hold tape at end of a board, corner of a building, or on to metal sheets or pipe while measurements are being taken, thus enabling one man to carry on this work unassisted. Hookring has two prongs,



3/8-in. apart, each prong having an anchor spur, enabling it to take a firm, square hold on the article to be measured. Prongs grip when tape is under tension, and also prevent losing hold by side sway. Tape releases itself when tension is released. Readily folded flat against tape-ring, out of the way so that it will not catch objects or prevent tape line from being wound fully into the case.—**The Lufkin Rule Co., Saginaw, Mich.**

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CABLE DOZECASTERS with angling blade for Allis-Chalmers HD-10 and HD-14 Tractors

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Capacities: 8-10-15 cu. yds.

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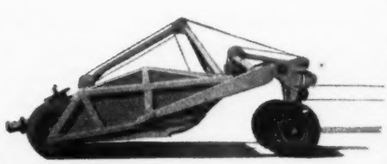
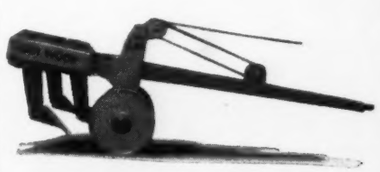
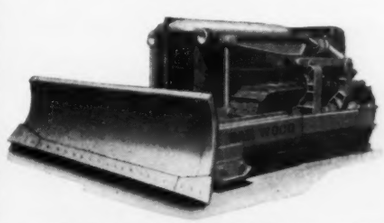


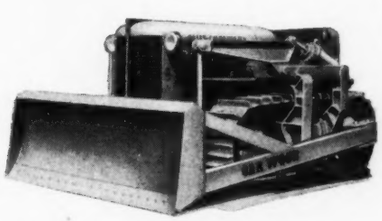
4-WHEEL CABLE SCRAPERS
Capacities: 11-15-20-25 cu. yds.



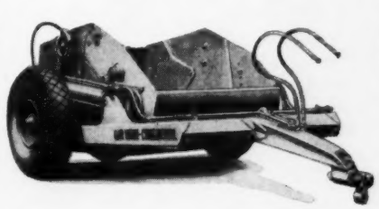
HEAVY DUTY RIPPERS
Cable and hydraulic operation



HYDRAULIC ROADBUILDERS with angling blade. For all Allis-Chalmers Tractors

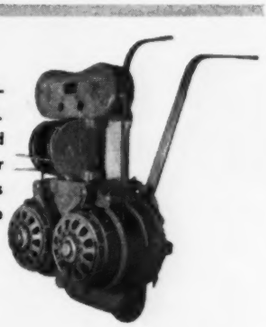


HYDRAULIC BULLDOZERS with fixed blade.
For all Allis-Chalmers Tractors



2-WHEEL HYDRAULIC SCRAPERS
Capacities: 3-5-6-8 cu. yds.

CABLE CONTROL UNITS. Double and single drum for 'most all makes of track-type tractors



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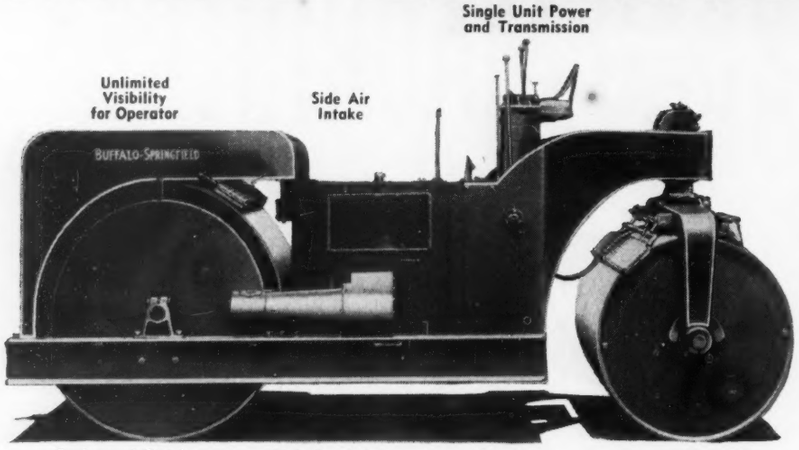


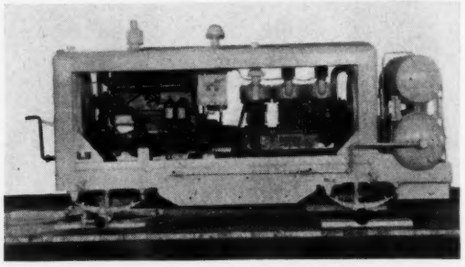
. . . Buffalo-Springfield Tandem Rollers

These features are the result of more than half a century of specialization in the design and manufacture of road rollers. Every detail is engineered to give Buffalo-Springfield rollers longer life, lower maintenance, better performance, and easier operation. That's why there are more Buffalo-Springfield rollers in use than all other makes combined. In addition to tandem rollers from 2 to 21 tons, the line includes three-wheel rollers from 6 to 12 tons, 3-axle tandems from 9 to 17 tons, and trench rollers for widening work.

THE BUFFALO-SPRINGFIELD ROLLER COMPANY Springfield, Ohio

Clipper
MASONRY SAWS
A special shape or shorter length need only be as far away as your Clipper Masonry Saw. The basic feature of Clipper is the new multiple cutting principle . . . . a method developed especially for Masonry Materials. You can be sure to cut with the fastest cutting speed and to obtain the longest blade life. Write for Catalog.
CLIPPER
MANUFACTURING CO.
4037 Manchester St. ST. LOUIS, MO.

VESSEL-TYPE COMPRESSOR, designed for Navy use on large salvage projects, is spring-mounted on four steel wheels which are removable for shipment. Diesel-engine powered, it produces 160 cu. ft. of air per min. Unit is equipped with two special valves, one permitting delivery of 100-lb. air



pressure in two-stage operation and the other affording 40-lb. pressure in single-stage operation. This requirement is handled with a three-way-throw valve permitting rapid conversion to desired air pressure by simply turning two valves. Complete set of specially designed underwater-type pneumatic tools and accessories are furnished with compressor, including two wood-boring machines, universal air motor drills and accessories, all with exhaust deflectors. Also included are Davey pneumatic saws suitable for underwater use.—**Davey Compressor Co., Kent, Ohio.**

You Can Help

● Paper is a Number 1 war material shortage — because over 700,000 different war items are wrapped, packaged, labelled, tagged, or made from paper or container board. The Pacific war, when it speeds up, will require stupendous amounts of paper and board since double and triple packing are required for protection against weather, insects, etc.

So please—

1. Share this magazine with your associates. Because of the paper shortage, the number of copies is limited.

2. Organize for a continuous drive in your office and plant to collect waste paper of any kind to put into paper salvage. Clean out old files, dead correspondence, obsolete records, useless display materials, cartons.

Aid the war effort—speed victory
DO THIS EXTRA BIT TO HELP.

THERE'S BEEN A BIG CHANGE

★ The one-horse plow is no match for the modern tractor. Likewise, the ordinary tapered roller bearing cannot compete with Tyson—the bearing with more load-carrying rollers.

The exclusive Tyson design gives you 30% more rollers around the raceway. These *extra* rollers mean *extra* capacity, *extra* rigidity, *extra* bearing life.

* * *

Is yours a heavy-duty job in transportation, industry, construction, agriculture? Use Tyson. It's a Better Bearing.

TYSON BEARING CORPORATION, MASSILLON, OHIO

COUNT THE ROLLS · THE ROLLS COUNT

Tyson

THE LAST WORD IN ANTI-FRICTIONEERING

★ BUY AND KEEP WAR BONDS ★

Gulf Quality Products and Fine Service help contractors keep ahead of schedule on another big airport job!

Two views of work in progress on Wood County airport, near Parkersburg, West Virginia, where Ralph Myers Construction Company of Salem, Indiana, and Western Contracting Company of Sioux City, Iowa, are moving 27,000 yards per day to keep well ahead of schedule.

RALPH MYERS Construction Company and Western Contracting Company are pushing equipment to the limit twenty hours a day to complete the airport project pictured above well ahead of schedule. Gulf quality lubricants and fuels help keep all this equipment on the job and working at top efficiency. These contractors know from experience that it's good profit insurance to specify Gulf products!

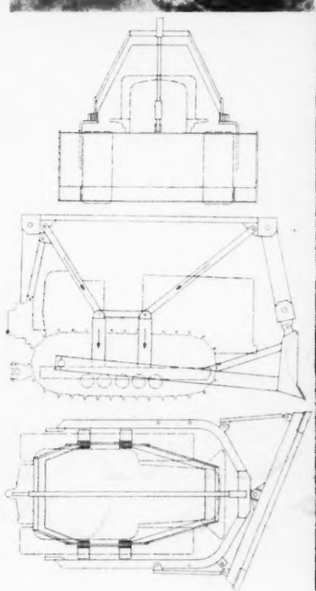
Leading contractors on all types of earth-moving jobs depend on Gulf quality products and fine service to help them beat contract schedules. For proper lubrication and efficient fuel performance result in less time out for their equipment, longer life, and less expense for maintenance.

Write, wire, or phone your nearest Gulf office today and arrange to use Gulf higher quality lubricants and fuels on your next job. Available to you through more than 1200 warehouses located in 30 states from Maine to New Mexico, they will help you complete it more quickly and at a larger profit.

GULF

GULF OIL CORPORATION · GULF REFINING COMPANY · GULF BUILDING · PITTSBURGH 30, PA.

SOUTHWEST
Cable Dozers



ANY WAY YOU LOOK AT IT . . . front, side or top . . . it's the slickest thing on two tracks. The "A Frames" and TWO "Over Center Track Mounted" brackets distribute the load evenly over the entire track frame, utilizing maximum tractive effort. No twisting, teeter-totter, action here.

MANY ADVANTAGES are also offered by Southwest Single Cable Controlled Rear Dump Hauling Scoops. Combination dozer-scoop hook-ups like the one pictured above are very popular—especially when both can be operated from one double drum Power Control Unit. Write for complete literature.

REMEMBER TOO, Southwest builds for all four makes of track-type tractors.

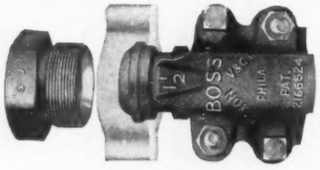
CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

ALHAMBRA, CALIFORNIA

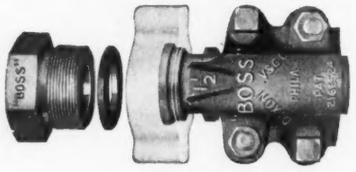
DIXON... *Designed and Built for Long, Efficient Service.*

DIXON design and construction gives the greatest possible assurance of long life and reliable performance in hose couplings, nipples, menders and clamps for every industrial service. The four couplings described here will handle the toughest jobs with unequalled safety and economy.



"G J-BOSS"
GROUND JOINT STYLE X-34 FEMALE HOSE COUPLING

For high and low pressure steam, air and liquid hose. Ground Joint construction provides permanently leakproof, soft-to-hard metal seal when wing nut is tightened. "BOSS" Offset Interlocking Clamp anchors coupling to hose with a powerful, full-circumference grip, without pinching. Corrugated stem assures added holding strength. Made in sizes 1/4" to 4", inclusive, and furnished with male or female spuds.

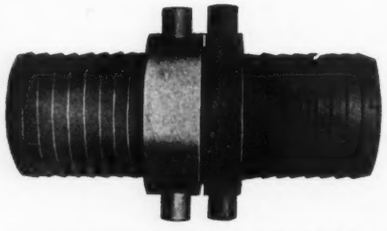


"BOSS"
WASHER TYPE STYLE W-16 FEMALE HOSE COUPLING

Same as "G J-Boss" coupling, except for method of sealing. Stem is extra strong, full length and has deep, clean corrugations. "BOSS" Offset Interlocking Clamp has exceptionally large gripping area that holds tight over the entire circumference of the hose to prevent leaks and pressure losses. Easily connected and disconnected. Made in sizes 1/4" to 4", inclusive, and furnished with male or female spuds.

"BOSS" MALE COUPLING STYLE MX-16

Companion to Ground Joint and Washer Type Female Couplings. Built to provide maximum strength, durability and safety on steam, air and liquid hose lines, including oil, butane, ammonia, etc. More convenient and economical than regular iron pipe nipples, as each size fits same size straight end hose. Can be quickly reset on the job. Sizes: 1/4" to 4", inclusive.



"KING" SHANK COUPLINGS FOR SUCTION and WATER HOSE

Strong, durable couplings made of all malleable iron; malleable iron with brass nut; or all brass. Uniform in quality, threading and dimensions. Shanks have deep clean corrugations. Sizes: 1 1/4" to 8", inclusive.

Carried in Stock by Manufacturers and Jobbers of Mechanical Rubber Goods

DIXON
VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA, PA.
BRANCHES: CHICAGO · BIRMINGHAM · LOS ANGELES · HOUSTON

SAFETY GOGGLE, intended for workers who face hazards of flying objects, has newly designed eyecup which is considerably larger in area and more face conforming than previous models, providing maximum eye protection, increased ventilation and greater comfort. Shaped separately to fit

contour of the right and left eye, cups fit snugly against face and protect eyes from objects striking from sides, top and bottom. Non-conductors of heat and electricity, new cups provide wider angle of vision. New nasal section and enlarged facial contact roll conform to shape of face. Smooth round edges fit snugly and stay in place comfortably. Supplied with either 50-mm. Super Armorplate lenses in white glass or 50-mm. Super Armorplate lenses in Calobar medium, dark or extra dark shades. If desired, six-curve Super Armorplate lenses can be furnished.—**American Optical Co., Southbridge, Mass.**

FASTER PAINT STRIPPING

Want an EASIER and quicker way to prepare your equipment surfaces for repainting? Here's how: Use recommended Oakite material applied by Oakite solution-lifting Steam Gun, Model No. 384. This combination makes short work of removing old paint, caked-on oil, grease and muck . . . leaves surfaces ready for new paint coat. Moreover, it eliminates laborious hand scraping . . . puts this work on an efficient, LOW-COST basis. Details FREE, Write TODAY!

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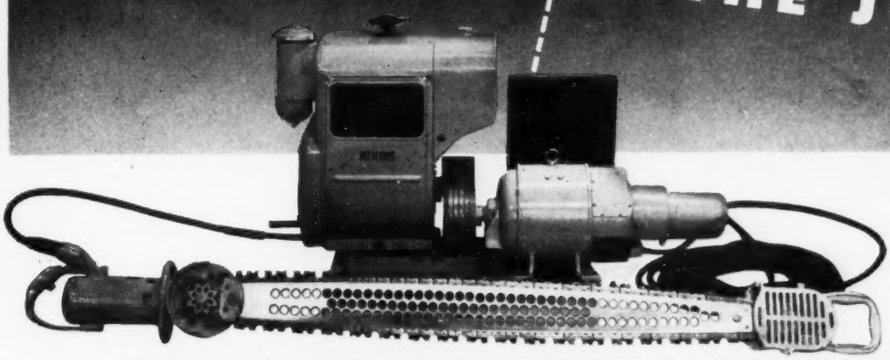
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE *Specialized* **CLEANING**
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

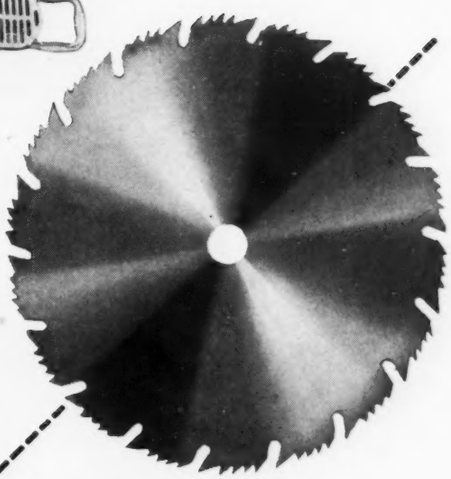
ATKINS Saws

SPEED UP THE JOB!



ATKINS CHAIN SAWS—Shown here is the Atkins Chain Saw "Package Unit," a version of the chain saw that contractors are finding mighty useful for heavy duty sawing. It consists of an air-cooled gas engine and generator mounted for use on tractor, truck or trailer. This unit is light, dependable under all climatic conditions, easy to handle. It can be operated 1000 feet from the generator unit.

ATKINS HAND SAWS—Well-liked wherever hand sawing is done, Atkins Hand Saws, like the No. 65 Straight Back, are all made of Silver Steel for keen edge-holding qualities. Sturdy Hand Saws by Atkins cut smoothly as well as quickly, help you get more work done in less time.



ATKINS CIRCULAR SAWS—For portable power saws or saw tables, Atkins No. 37 Tooth Mitre Saw is favored for general work. It is one of the full line of Atkins Silver Steel Circular Saws. All are distinguished by their ability to cut cleanly at high speeds, turn out greater quantities of work with less filing.

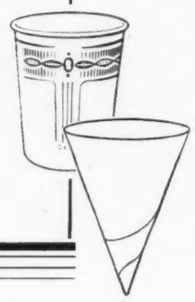
SAWS FOR *every* NEED

Whatever your need for saws, Atkins has the type and quality to help you do the job faster and at lower cost. In addition to the saws shown, the Atkins line includes Hacksaws and Blades, One and Two-man Crosscut Saws, Docking Saws, and many special types. Ask your dealer for further information on any of them. Let Atkins help speed up *your* operations!

E. C. ATKINS AND COMPANY • 485 S. Illinois Street, Indianapolis 9, Indiana

AGENTS OR DEALERS IN ALL PRINCIPAL CITIES THE WORLD OVER

A NUMBER 1 HELP IN KEEPING MEN ON THE JOB



Health protection is a first step toward keeping men at work.

A "natural" for protecting health is the Dixie Portable Water Carrier, equipped with single-use Dixie or Vortex cups. It . . .

★ HELPS CHECK THE SPREAD OF SUCH MOUTH-BORNE INFECTIONS AS COMMON COLDS, "FLU".

★ ELIMINATES TRIPS TO WATER WAGONS.

★ CUTS DOWN "VISITING" ON THE JOB.

★ HELPS SPEED PRODUCTION BY SAVING PRECIOUS WORKING HOURS.

★ DOES AWAY WITH MANY DRAWBACKS OF THE OLD "BUCKET AND DIPPER" DAYS.

Write for descriptive folder giving complete information on this portable water service, including tanks, dispensers and cups.

Dixie and Vortex Cups are made at Easton, Pa., Chicago, Ill., Darlington, S. C., and Toronto, Canada

DIXIE CUPS

DRINKING CUPS AND FOOD CONTAINERS

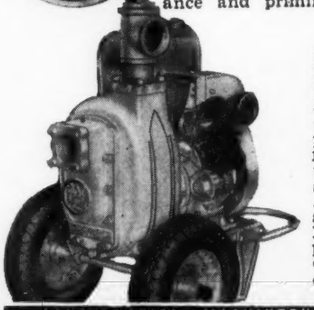
BORING BARS with separate tool bits for small diameter holes, are presented by their makers as companion tools to Clark adjustable tool holders and are available in sets of four, 3/16x5, ¼x6, ⅜x7 and ½x8 in. Made from selected tool steel and heat-treated for maximum rigidity, design and construction of these tools are claimed to assure

accuracy in precision internal boring and threading. Lever-lock feature securely grips tool bit in such a way that boring or threading to bottom of hole is possible without interference from set-screws or bolts. Boring bars are designed for use without bushings or adapters, and require no special clamps or holders. One precision ground high speed threading bit and one boring bit are provided with each boring bar. Lever-lock holds tool bit at right angle on one end and at a 15-deg. angle at opposite end. Replacement cutters are readily made from round carbon or high speed steel drill rod. Thus use of expensive solid forged bars is completely eliminated.—**Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif.**

They Can Take It

DUAL PRIMERS

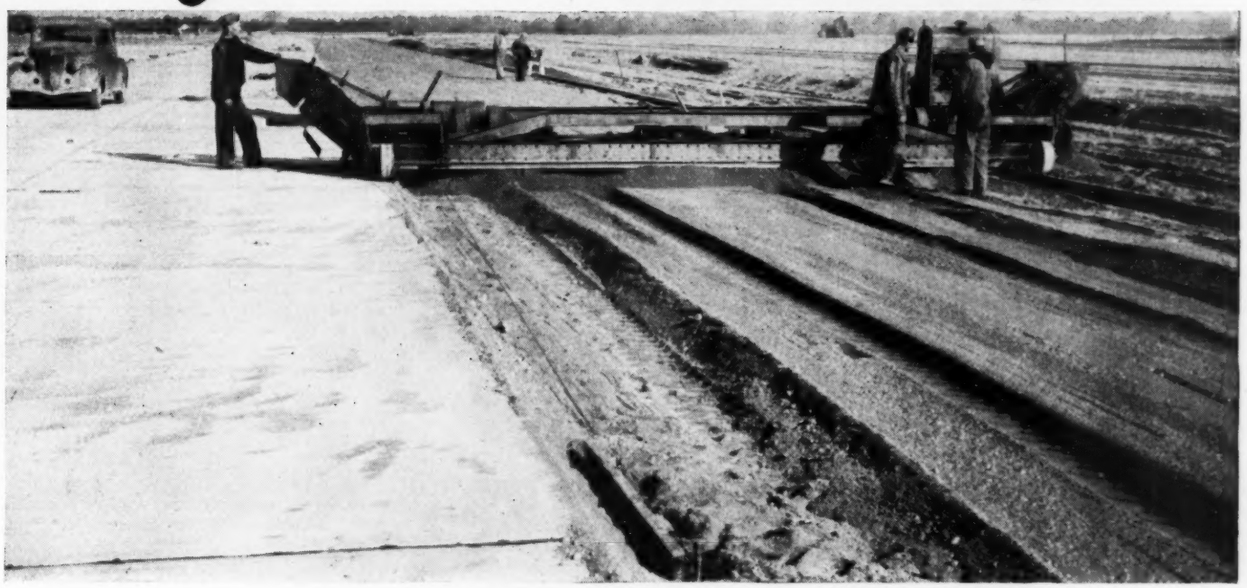
When it comes to DURABILITY, CMC Dual Primers have the "guts" to stand up to those tough, steady 24-hour grinds. DUAL PRIME means unmatched performance and priming speed.



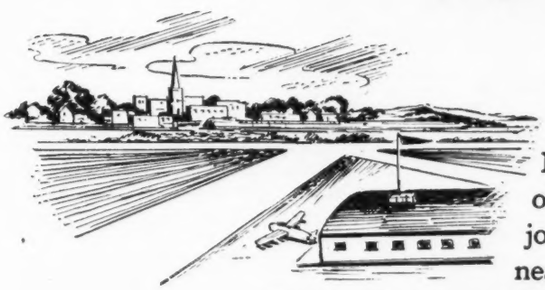
A husky 3" CMC Dual Prime. One of the complete line from 1½" to 10" sizes. Also 3" and 4" Diaphragms. Get catalog.

CONSTRUCTION MACHINERY CO.
Waterloo, Iowa
Mixers • Pumps • Hoists • Batching & Placing Equipment • Saws • Carts • Barrows

when Corntassel Corners builds an Airport...



...will you DO THE PAVING?



You can get the contract if you have the equipment for doing a better job for less money in a shorter time. Buckeye R-B Power Finegraders for preparing subgrade offer you big advantages on any paving job. They save labor by doing away with nearly all hand labor on the grade. By keeping the prepared grade always well ahead of the pavers they eliminate expensive delays. Less material is required because accurate subgrade reduces loss of yield to a negligible percentage. All types of soil, including sticky gumbo and rock-laden materials are readily handled. Write for full details today. Get ready for tomorrow's big paving jobs now!

Built by Buckeye

Buckeye Traction Ditcher Co., Findlay, Ohio

Convertible Shovels

Trenchers

Tractor Equipment

Road Wideners

R-B Finegraders

Spreaders

1500 Units

TO THE ARMY AND NAVY...

That is why we haven't been able to do very much for our friends in civilian clothes.

Carload after carload has gone out from GRUENDLER to all parts of the world.

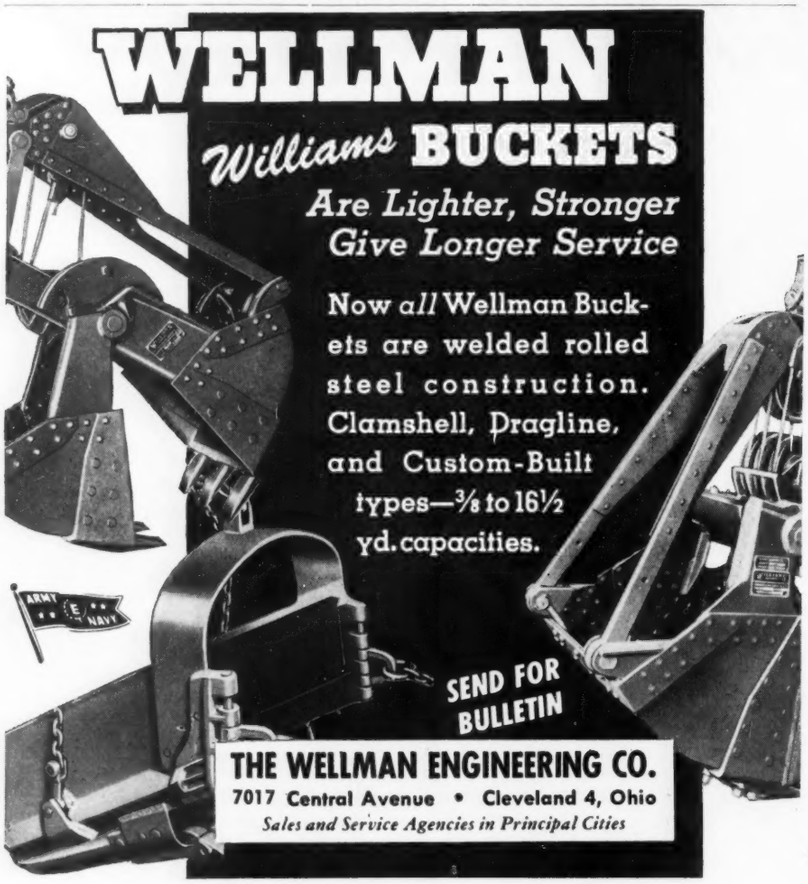
Working for the Army and Navy has been a great experience—and a good one too. We have learned a lot of things that are going to make GRUENDLER CRUSHERS do a better job in a better way than ever before.

Some units have now been released and are in production. Write for data and delivery dates.—The unit you want may be available.

GRUENDLER ST. LOUIS, U.S.A.

GRUENDLER

CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI


WELLMAN
Williams BUCKETS
Are Lighter, Stronger
Give Longer Service
Now all Wellman Buckets are welded rolled steel construction. Clamshell, Dragline, and Custom-Built types—3/8 to 16½ yd. capacities.
ARMY E NAVY
SEND FOR BULLETIN
THE WELLMAN ENGINEERING CO.
7017 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in Principal Cities

NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below will keep you posted on latest developments in construction equipment and materials available for your use.

USES OF STEEL GRATING—**Walter Bates Co.,** Joliet, Ill. (16 pp. illustrated) Comprehensive treatise on uses of open steel flooring and stair treads with suggestions for improved design and construction. Shows how and where steel grating can be economically installed to provide necessary overheads, floors, platforms, pit coverings and stairs and tells how to make it safer and easier to maintain. In addition, charts show how to determine exact safe loads for open steel flooring.

★ ★ ★

PNEUMATIC TIRE LIFT TRUCKS—**Willamette Hyster Co.,** 2902 N.E. Clackamas St., Portland 8, Oregon. (4 illustrated catalogs) New booklets describe and illustrate complete line of pneumatic-tired, gasoline-powered lift trucks featuring action pictures and actual work applications as well as mechanical specifications. Suggests many new uses for lift trucks in materials handling field. Hyster fork-type lift trucks are manufactured with capacities from 2,000 to 15,000 lb. Straddle truck line has load limit of 30,000 lb.

★ ★ ★

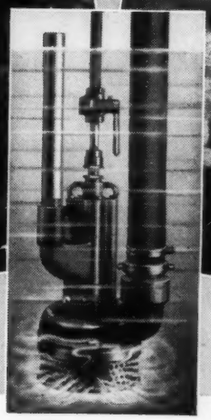
UREA RESIN GLUES—**Bakelite Corp.,** 30 E. 42nd St., New York 17, N. Y. (12 pp., illustrated) Covers low cost, wet strength and adaptability of these resins as well as types of equipment used. Purposes for which they are best suited are discussed and a special chapter is devoted to potential development of urea glues.

★ ★ ★

FLOOR INSTALLATIONS—**Walter Maguire Co., Inc.,** 330 W. 42nd St., New York 18, N. Y. (4 pp., illustrated) Features installations of Emeri-Flor, made with Cortland emery aggregate and claimed to be practically indestructible and slip-proof. More than 300 separate installations covering 98 different industries are listed alphabetically by name of plant and in each case the type of service encountered is defined. Brief introduction gives information for the selection of heavy-duty, non-slip flooring.

FAST PUMPING with the CLECO-DEMING No. 183

On this job the water dropped so fast that the operator stayed with his valve.



Water gushing from the discharge pump at over 200 gallons per minute.

THIS air operated pump has no equal for the rapid expulsion of liquids from sumps, basements, pools, ship holds, manholes, cofferdams, ditches, etc.

Weighing only 58 lbs., easily portable, the Cleco-Deming sump pump is self-priming, and operates without hesitation when wholly or partially submerged. A screen, easily removed for cleaning, prevents stones or trash from clogging the impeller. All working parts are Cammelite plated to prevent rust. Special design features insure adequate lubrication at all times. For use with oil or gasoline, a bronze body is available at slight extra cost to safeguard against sparks. Write for Bulletin 86.

While the armed services are using Cleco-Deming sump pumps extensively, our production facilities enable us to supply these pumps for commercial use also.

MEASURED CAPACITIES

With Air at 80 lbs. Gage Pressure

Against 10-ft. Head . . . 230 Gals. per Min.
Against 20-ft. Head . . . 218 Gals. per Min.
Against 30-ft. Head . . . 195 Gals. per Min.
Against 40-ft. Head . . . 170 Gals. per Min.
Against 50-ft. Head . . . 145 Gals. per Min.

Maximum Head, 75 Feet

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THE CLEVELAND ROCK DRILL COMPANY

Division of The Cleveland Pneumatic Tool Company

CABLE ADDRESS: "ROCKDRILL" • CLEVELAND 5, OHIO.

LEADERS IN DRILLING EQUIPMENT

PRECAST
CONCRETE PRODUCTS
Solve Many Construction Problems

In public as well as private construction work precast concrete products are gaining favor steadily, forecasting a new and rapidly expanding products industry.

Precast tanks, manholes and covers, bridge railings, floor slabs and wall blocks are now in common use as are columns, lintels, joists, cornices and a host of other items. In many cases the products cost less than the patterns and forms to reproduce them.

But when you buy and use precast concrete products, be sure to specify calcium chloride in the mix because you will thus get smoother finish and better strength, while the maker gets better production. Our Bulletin No. 28, "Early Strength Concrete" is sent on request.

CALCIUM CHLORIDE ASSOCIATION
4145 Penobscot Bldg. • Detroit 26, Mich.

CALCIUM CHLORIDE

SPEEDS YEAR ROUND CONCRETE CONSTRUCTION

2 POWERFUL MODELS

Available for 110-volt A.C. or D.C.; 220-volt A.C. or D.C.

MODEL 120—
12" blade, 4½" cutting capacity

MODEL 80—
8" blade, 2½" cutting capacity

ADD EASE SPEED and PRECISION to HEAVY SAWING WITH A MallSaw REG. U.S. PAT. OFF.

Model 120

★ This powerful 12" MallSaw is built for extensive sawing of heavy lumber and timber. Also cuts non-ferrous metal, cuts and scores concrete, tile and stone with an abrasive wheel. High speed, heavy duty motor withstands hard, continuous usage—has power to spare. Easily adjusted for depth or bevel cuts.

★ Extra speed reduces sawing time—accurate cuts assure square board ends and better fitting parts. Multiple cutting of like members speeds construction.

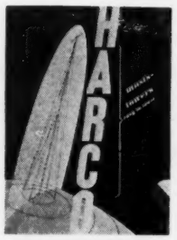
★ Light in weight and perfectly balanced for easy handling. Takes waste motion, fatigue and backaches out of heavy cutting jobs.

Ask your distributor or write for literature and prices.

MALL TOOL COMPANY, 7757 So. Chicago Ave., Chicago 19, Ill.

ARMY E NAVY

Mall REG. U.S. PAT. OFF. **PORTABLE POWER TOOLS**



RADIO OR STRUCTURAL TOWERS—**Harco Steel Construction Co., Inc.,** 1180 E. Broad St., Elizabeth 4, N. J. (24 pp., illustrated) Describes and illustrates various types of masts and towers, designed principally for radio communication, television and radar, but adaptable to many other uses, the Bantam and Beacon King models having large, roomy platforms for the support and servicing of numerous kinds of equipment. Bantam King is suitable for stationary or movable scaffolding, temporary elevator shafts, or firemen's training towers. The Beacon King is claimed to be excellent for use in observation, for floodlights and railway signal towers, water tank supports, oil derricks and diving platforms. Light weight of individual parts and simplification of design assure easy erection of these towers, average weight of members being 5.3 lb. and heaviest topping scales at 8 lb. Bolt and sleeve construction make possible erection of these triangular towers in lengths from 90 to 425 ft. by unskilled labor. Four-man crew is adequate for erection of all towers and erection time runs from 10 hr. for the 90-ft. design to 50 hr. with the 425-ft. model. Advantages: (1) speedy erection; (2) small unskilled crews; (3) elimination of erection hazards; (4) adaptable to adverse weather conditions; (5) light weight, compactness; (6) structural soundness; (7) low maintenance and portability.

★ ★ ★

HALF-TRACKS—**The Linn Manufacturing Corp.,** Morris, N. Y. (6 pp., illustrated) Devoted to description of Linn Haftraks and Linn Catruk, hard duty vehicles for all types of off-the-highway service. Types shown include Linns with various types of bodies for moving rock, coal and ore; side-tipping dump body; Linn pole trailer with log bunks for logging; snow-plow mounting. The Catruk models which are equipped with four wheels and tracks, permit operation as a truck or half-track, according to ground conditions. Rear wheels are hydraulically retractable. Bulletin will be sent free on request to any one interested in moving loads from 5 to 50 tons, where steep grades, deep mud, snow and ice, sand and rocks make negotiation with wheeled vehicles impractical.

★ ★ ★

OXYACETYLENE PIPELINE DISTRIBUTING SYSTEMS—**Victor Equipment Co.,** 844-854 Folsom St., San Francisco, Calif. (84 pp., illustrated) Gives comprehensive review of entire subject from production of calcium carbide and acetylene gas to the equipment needed for oxyacetylene distributing systems. Replete with illustrations, charts and easily read engineering data. Answers, authoritatively, all pertinent questions. Free circulation of this book is restricted to engineers and welding department supervisors.

★ ★ ★

FACING TILE—**Structural Clay Products Institute,** 1756 K St., N.W., Washington, D.C. (24 pp., illustrated) The Facing Tile Institute, an affiliate of the Structural Clay Products Institute, national association of manufacturers of brick and tile, has issued its new 1945 facing tile catalog which contains specifications, finishes, colors and shapes of glazed and unglazed facing tile produced by the members of the Institute.

A Heil Cable Trailbuilder or Bull Dozer, mounted on your International TracTracTor, provides a perfectly balanced team.

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And if abnormal wear seems to be evidenced, call in a Roebling engineer. He makes tests and recommendations that will save you future rope worries and excessive costs.

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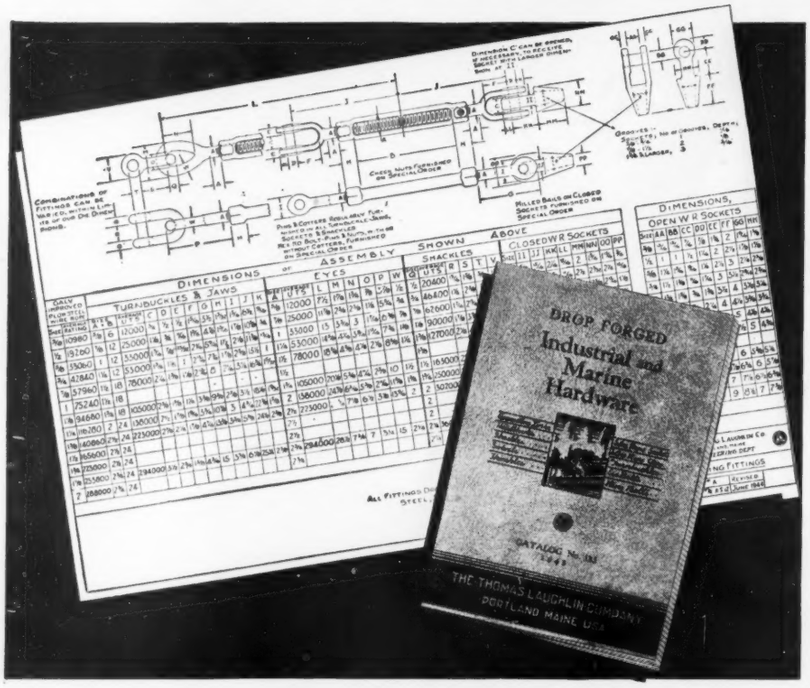

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THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

LUMBER AFTER WAR—**American Forest Products Industries, Inc.,** 1319 Eighteenth St., N.W., Washington, D. C. (20 pp. illustrated) S. R. Black, vice-president of the Weyerhaeuser Sales Co., St. Paul discusses following vital questions in regard to lumber, "How Much? How Good? How Long?," reaching conclusions encouraging to distributors, dealers, builders and architects who may have been disturbed by pessimistic reports. Logging and lumber manufacture are hardly out of the pioneering stage, according to Mr. Black who foresees the time when new growth of forest lands will exceed present requirements, thus opening the way to the development of new and greater markets for wood.

★ ★ ★

SOUND INSULATION VALUES OF FLOORS AND WALLS—**The Insulation Board Institute,** 111 W. Washington St., Chicago 2, Ill. (8 pp., illustrated) Information contained in this folder, the Institute believes, will be of considerable value to architects, and builders in planning homes, hospitals, offices and other structures where transmission of noises between rooms is a problem to be overcome. Contains results of tests made to determine extent to which air-borne noises are transmitted through walls and floors of buildings, and includes findings on eight types of wall panels and six types of floor construction. According to the foreword, the claim of insulating board manufacturers that structural insulating board reduces sound transmission when properly applied is substantiated by these tests.

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INSLEY MANUFACTURING CORP., INDIANAPOLIS 6, IND.

India-Burma-China Pipeline

Built by U. S. Engineers

(Continued from page 70)

mi. through the jungle and reassembled on location. Numerous cable suspensions were constructed over the many chasms that had to be spanned. For one 20-mi. section, one-tenth of the line had to be supported by cables. Included in the project is an 8,200-ft. submarine crossing of the Brahmaputra River. A force of 200 Engineer troops laid an average of 3 to 10 mi. of the pipeline per day, depending upon the condition of terrain and supplies.

Under ideal operating conditions nearly 30,000 tons of liquid fuel a month can

(Continued on page 147)

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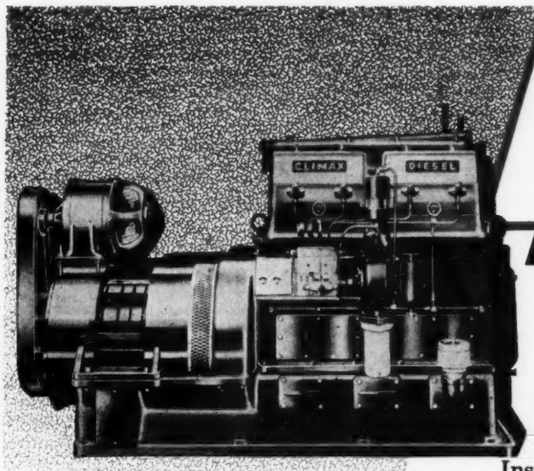

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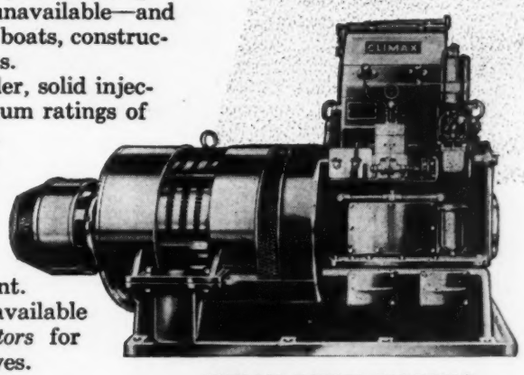
Engines are 2 and 4 cylinder, solid injection full Diesels, with maximum ratings of 22 and 44 h.p. at 1200 r.p.m. Standard equipment includes American Bosch fuel pump and injection nozzles, positive lubrication and cooling and electric starting equipment. Engines are also available *without generators* for mechanical drives.

For complete information and specification bulletin, write Climax Engineering Company, Clinton, Iowa.



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consisting of Model D 148 2-cylinder engine direct connected to 15 kva generator.

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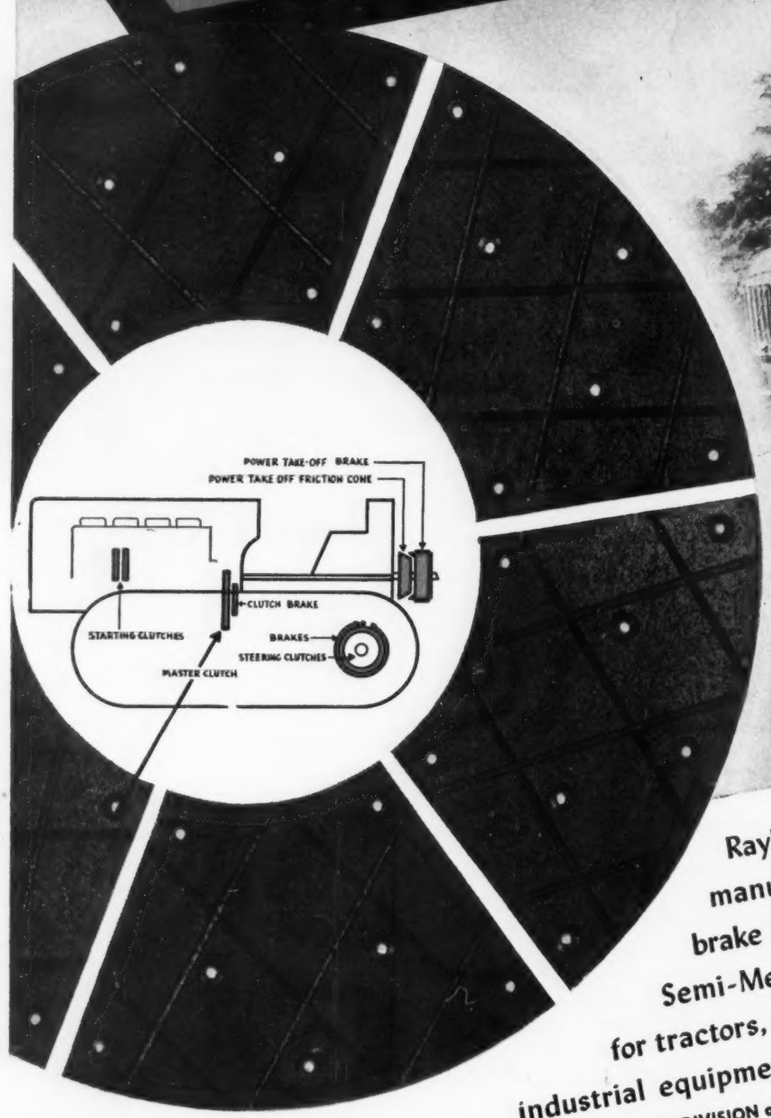

Raybestos leads in being the only manufacturer of all four types of brake linings and frictions—Metallic, Semi-Metallic, Woven and Molded—for tractors, as well as for all other types of industrial equipment.

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Ray-Metl Master Clutch Facing for tractors. A composition of asbestos and fine metallic powder

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Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

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Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

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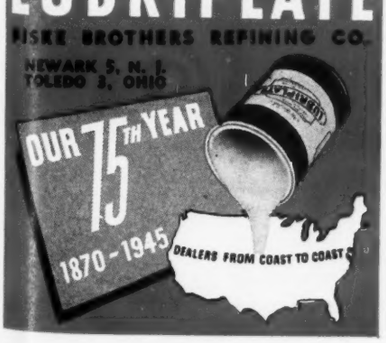

GATE VALVES are installed at frequent intervals along line.

(*Continued from page* 144)

be pumped through a 6-in. invasion pipe and about 14,000 tons through the 4-in. pipe. The pipeline is carrying gasoline and oil to planes deep in Burma and releasing much of the air transport and Burma-Ledo Road tonnage for carrying munitions and other supplies.

★ ★ ★

PREVENTING *Construction Accidents*

(*Continued from page 66*)

operation may run into uncontrolled interference between (1) equipment and men, (2) equipment and equipment, and (3) men and men.

Even though these uncontrolled interferences may occur only intermittently, it is possible at any of these points to have a serious interruption caused by damage to equipment or injury to men. In addition, the conflicting flow lines indicate that the desirable condition of continuous flow is definitely lacking in this methods design. If the greatest possible yardage of concrete is to be placed each day, interferences caused by possible contact of equipment and men must be reduced to a minimum.

In *Fig. 5*, operating methods are redesigned to eliminate as many interferences as possible. The office and cement storage buildings are located on the west

(*Continued on page 148*)

LUBRIPLATE
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Industry, especially food packers, have long required a waterproof lubricant that was clean and easy to apply. LUBRIPLATE No. 107 is the answer. It is a general purpose lubricant, white in color and just the right density for application by pressure guns or grease cups. LUBRIPLATE No. 107, like other LUBRIPLATE products, arrests progressive wear, saves power, and protects machines against rust and corrosion. It will pay you to try LUBRIPLATE and see how it will cut down repairs.

Rx FOR YOUR MACHINERY

No. 3—Ideal for general oil type lubrication. Ring oiled bearings, wick feeds, sight feeds and bottle oilers.

No. 8—Because of its high film strength and long life reflects outstanding performance in most types of enclosed gears (speed reducers).

No. 107—One of the most popular grease type products for general application by pressure gun or cups.

No. 70—For a wide range of grease applications, especially at temperatures above 200 degrees F.

No. 130-AA—Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING—This is the LUBRIPLATE lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.

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(Continued from page 147)

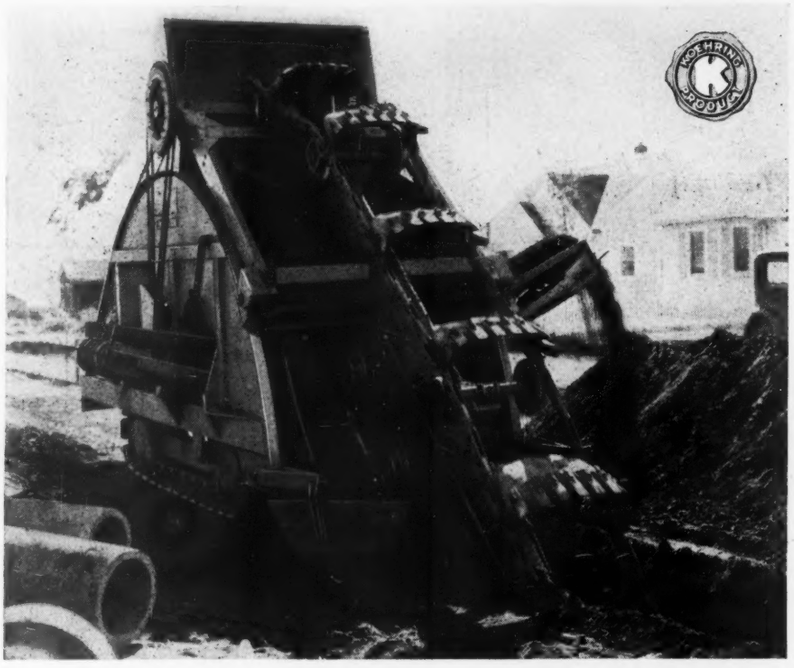
side of the road, and materials supply trucks are requested to come in from the west and leave the job toward the east, thus simplifying and improving the overall traffic problem of entering and leaving the job. Instead of backing cement trucks in front of the shed for unloading, as in the previous plan, thus plugging the artery of supply, these trucks now are parked parallel to the center line of the road, allowing traffic to pass.

It is impossible to eliminate the backing of trucks to unload gravel and sand for the mixer; but, by putting the mixer on the west side of the road, the superintendent can instruct all supply trucks to turn around in the same area that the sand and gravel trucks use to make their turns and can thus confine to one location the zone of danger to both equipment and men.

Timber curbs set up at the edge of the road to protect men working in and around the office, cement shed and mixer, permit these men to perform their work without having at the same time to guard themselves against impact with equipment entering or leaving the job. Freedom from this danger improves the efficiency and output of the workmen and

(Continued on page 150)

PARSONS
250 TRENCHLINER



GETS BIGGER BITES WITH CLEANER BUCKETS

Spring loaded bucket scraper scoops out sticky material. Cleaned-out buckets take bigger bites.

Clean trencher buckets take bigger bites. On the Parsons 250 Trenchliner each bucket that bites into the trench is clean. Spring loaded bucket scraper (see picture below) cleans out sticky materials as bucket load is dumped, leaves each bucket empty. Gumbo clay can't stick, can't cut down trenching efficiency. Here are more reasons why the bucket line on the Parsons 250 Trenchliner can dig more trench per day: 1. Light weight, high strength digging buckets have wear resisting cutting lips. 2. Bucket teeth are forged of abrasion-resistant alloy steel. 3. Same teeth are used for both bucket and side-cutters. 4. Excavator chain links are heat hardened. 5. Connecting pins are self-locking, have no cotters.

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40,000 square yards per day *is* unusual production for a Wood Roadmixer, but it can be done. Of prime importance, however, is the fact that such production is achieved with minimum equipment and man power.

The Wood Roadmixer is a *complete* traveling mixing plant. A working unit consists of three pieces of equipment, the Wood Roadmixer, a crawler tractor which pulls and powers the Roadmixer, and a binder supply truck. Two men can handle the average job. Traveling at a regulated speed with synchronized mixing, the Wood Roadmixer produces in *one pass* a predetermined mix ready in minutes for spreading.

Using native or local materials and handling road oil, emulsion or soil-cement mixes, the Wood Roadmixer provides obvious savings in equipment, materials and labor. The long life and low maintenance record of Wood Roadmixer paving is conclusive proof of its high quality.

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(Continued from page 148)

reduces the possibilities of accidents.

For control of the last of the three classes of interference, contact between men and men, the flow lines on the buggy runway are readjusted as indicated by the drawing to minimize the possibility of such contact.

This same method of analysis can be followed as a building increases in height by studying operations design in both a vertical and a horizontal plane and testing the design procedure for the three types of interferences. This kind of control and direction of all movement on a job helps to raise production to its maximum. Actual cases have shown that, with control of this type, production has been increased up to 20 percent over previous experience on the same kind of project.

An interruption caused by injury to a workman is just as damaging to production as an interruption caused by lack of positive free flow. Analyzing operations for movement design not only assures positive production flow but also eliminates zones which produce accidents. It is impossible to divorce production control from accident control; they are so interrelated that both phases of the job must be considered if greatest efficiency is to be attained.

Cofferdam Failures

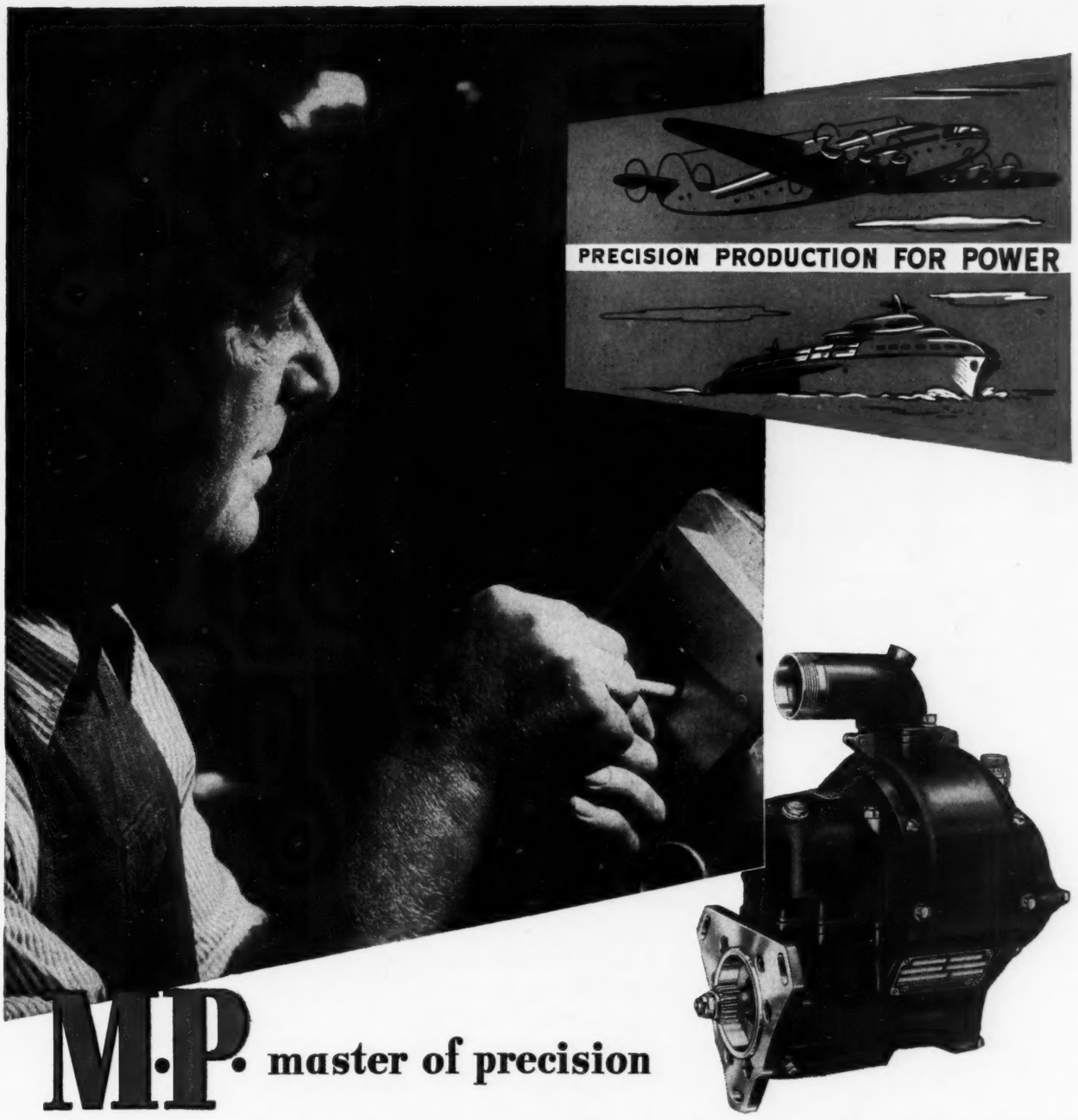
Improper methods design which involved both structural and procedural errors led to the collapse of a steel sheetpile cofferdam for a bridge pier. *Fig. 6* indicates steps in the inadequate procedure designed by the contractor and shows by area diagrams the amount of hydrostatic pressure assumed in the design for each set of timber wales and braces.

Mathematical analysis of the cofferdam design showed that, with all bracing in place and the cofferdam pumped dry, the sheetpiles, wales, braces and posts would be adequate and would provide a proper factor of safety. The contractor's methods of pumping out the cofferdam to successively lower levels to install sets of bracing, starting from the top down, as shown by the steps in the drawing, imposed stresses in both sheets and braces far in excess of the design loads and resulted in failure of the cofferdam.

When step *No. 4* was reached, the stress in the steel sheets was 62,000 psi., practically the breaking load, and the stress in the long, unsupported braces of set B was about 30,000 psi., as compared with an allowable load of about 7,500 psi.

At this stage, the cofferdam collapsed, catching eleven men, one of whom was killed and ten seriously injured. In ad-

(Continued on page 152)



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American Bosch Magnetos are serving with distinction on many of our great warplanes and in more than 25 other Army and Navy applications.

You're looking at one small example of American Bosch Precision Production for Power. This "master of precision" is forming a die from which will flow an endless stream of vital magneto parts.

There are more reasons than one why America's engine builders come to American Bosch. One is the traditional New England craftsmanship. A second is the specialized engineering skill to solve fuel injection, ignition and related problems. A third is the advantages of a world-wide organization which has been built over the years to provide maintenance service for American Bosch products.

AMERICAN BOSCH CORPORATION • Springfield 7, Massachusetts

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AUTOMOTIVE AND AVIATION ELECTRICAL PRODUCTS • FUEL INJECTION EQUIPMENT

Essential on every construction job to do the heavy lifting, lowering, pushing and pulling, Duff-Norton Jacks give you strength, easy operation and dependability!

Duff-Norton Jacks take plenty of punishment too, and give you long years of satisfactory service. The complete Duff-Norton Catalog gives you full details on every type and size. Write for your copy.

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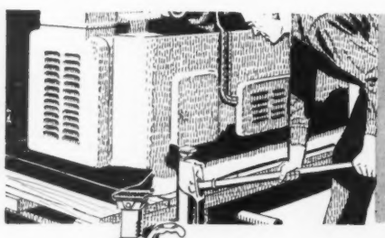

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Your Industrial Distributor Handles DUFF-NORTON JACKS

(Continued from page 152)

dition, the result was a total loss to the contractor of all the work that had been done up to this point.

This experience shows definitely the necessity for recorded methods design. The contractor had installed other cofferdams by methods similar to those described, but the depth of water and size of cofferdam had never been so great as for this bridge pier. In all probability, the factor of safety in the structural design had saved the other cofferdams and permitted the contractor to proceed in ignorance of the danger. Past experience will not always indicate the proper method, because previous jobs may have overstressed the materials, though not sufficiently to cause collapse.

Cofferdam in Sloping Bank

Fig. 7 illustrates another cofferdam problem where failure to give proper consideration to structural stability in designing the working method led to collapse. The cofferdam was located in a river, near the edge of the stream, in a fairly steep bank which had a slope of about 30 deg. with the horizontal. To build the cofferdam, the superintendent placed a trestle on the bank above the water's edge, in line with the cofferdam, and set on the trestle a crane which could reach every point in the cofferdam.

Superficially, this method appeared to be most efficient. The cofferdam was in shallow water, and the quantity of earth excavation to be removed from inside the steel sheeting was relatively large. After driving the steel sheetpiles, the crane could excavate one lift after another with a clambshell bucket to permit installation of successive sets of bracing, in accordance with the superintendent's plan. To speed the excavation, the spoil would be cast on the upstream and downstream sides of the cofferdam.

Because the methods design did not consider all the forces at work in this location, the cofferdam failed. As indicated by the cross section in *Fig.* 7, removal of material from inside the cofferdam reduced the mass of earth which held the bank in equilibrium and lessened by this amount the resistance to sliding. As excavation proceeded, increasing pressures were transmitted through the bracing in the cofferdam to the undisturbed toe of the slope on the outer side of the cofferdam.

In the methods design, the problem of earth pressures had not been considered. Unbalanced earth pressure on the land side, increased by the weight of the trestle, crane and equipment, finally exceeded the resistance to sliding of the

(Continued on page 155)

Making little ones out of *big* ones

PORTABLE PLANTS

Austin-Western Portable Crushing and Screening Plants are made in a wide variety of types and sizes; each complete with whatever is required in the way of conveyors, screens and bins.

• Key to the successful and profitable operation of any plant is the crusher itself . . . reason enough for the painstaking engineering behind every Austin-Western jaw and roll model.

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The same skilled engineering characterizes each and every Austin-Western crushing and screening plant, from the most simple to the most elaborate; each tailor-made to the requirements of a particular production problem.

AUSTIN-WESTERN COMPANY,
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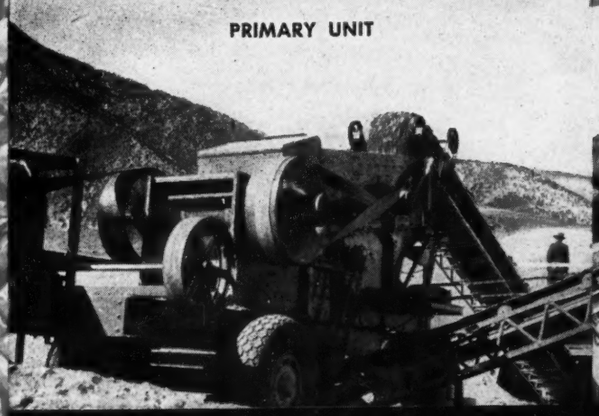
PRIMARY UNIT



SECONDARY UNIT

TWO-UNIT AND THREE-UNIT PLANTS

Suitable for either pit or quarry use, these plants are capable of delivering highest tonnages of aggregate in accurately controlled sizes. Frequently, each unit is capable of producing material that meets job requirements, in which case the individual units can be used separately as shown in the photographs above. Such flexibility of operation spells maximum profits for the owner.

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Enginairing is still doing a vital job in controlling trains . . . but it is helping solve a lot of other difficult control problems. Many of the nation's fighting ships today have new maneuverability, new speed of response, through Enginaired controls. The entire cycle of engine operation—starting, stopping, reversing, speed regulation, application of shaft brakes, and clutching and de-clutching—is controlled from a single station.

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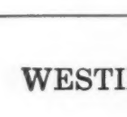
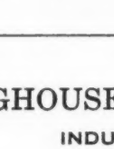
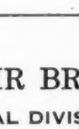

WABCO PACKING


COMPRESSORS


PNEUMATIC CONTROLS

(Continued from page 152)

material, and the bank failed, causing collapse of the cofferdam.

For proper design of a method to be used in this location, it would have been advisable to determine, by existing soil mechanics information, the stability of the slope and the failure plane of the bank. In addition, it would have been advisable to locate the crane at the upstream or downstream end of the cofferdam, as shown by the dotted lines in the plan of *Fig. 7*, in order to cast the excavated material to the river side of the cofferdam, thus adding to the weight and resistance against bank failure.

Collapse of the cofferdam caused the loss of 60 percent of all the steel sheetpiling and braces, involving $16,000 damage to this equipment. Because the bank failure took place gradually over a period of about 10 min., all men in and around the cofferdam were able to leave the danger zone, and no human injuries resulted. The cofferdam collapse illustrate again that improper methods cause failures. Recorded design of the method is of utmost importance in determining the safety of both equipment and men.

★ ★ ★

Pavement Widening

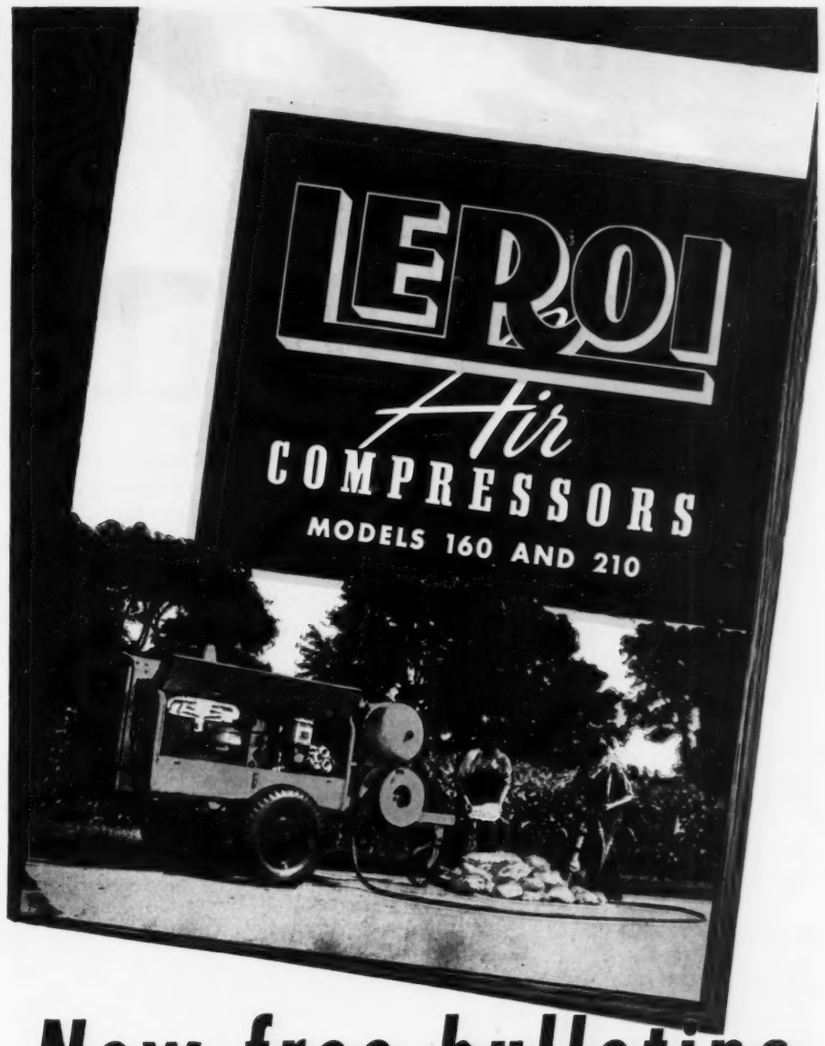
(Continued from page 77)

to high density, as necessary on the heaviest bus and truck routes, it is believed that this course ought not to be thicker than 1¼ in. At stop signs and bus stops, where highest density is essential, a 1-in. course will give better results. Greatest stability is more easily obtained with heavy rollers on comparatively thin layers.

On average roads or streets with no serious traffic requirements, a surface course of 2-in. maximum thickness may be used. Base courses may be laid up to and including 3 in. in thickness. In cold weather it is undesirable to lay thin courses. Thicker courses hold the heat better and permit rolling to proper density; greater heat also produces stronger adhesion to the surface on which the mixture is laid.

Maximum size of aggregate should be no greater than two-thirds of the thickness of the course in which it is used. Some good engineers recommend that the maximum size in the top course be not more than one-half or even one-third the thickness of the course. It is not necessary that an aggregate of this maxi-

(Continued on page 156)



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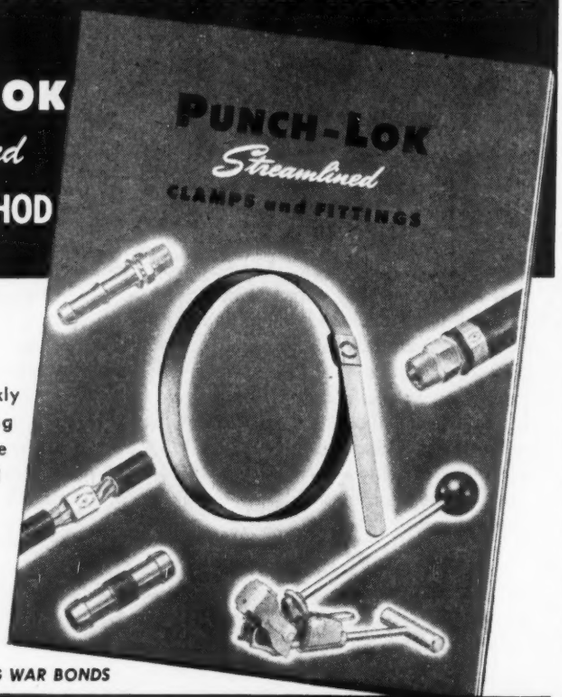

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(Continued from page 155)

mum permissible size be used. Where the thickness of the base course will permit, some engineers employ a coarse graded aggregate up to a maximum size of 2 in. Under the rule given above, this maximum size ought not to be placed in any course with a depth of less than 3 in. No preponderance of evidence indicates that the maximum size of aggregate should be used in a bituminous concrete course. With coarser aggregate, less asphalt is required in the mix, and the cost for the same thickness of course may be lower.

Variation is permissible in the maximum size of aggregates to be used in any course. Availability of aggregates which meet the grading requirements frequently determines the size. When only small amounts of separate mixes are required at any one time, the contractor's complications at the plant are greatly reduced by using the same mix for all purposes. It is good practice to permit a contractor to substitute top course mix for base courses if he elects to do so.

In two-course work, each not over 1¼ in. thick, it is customary with some engineers to specify the same grading of aggregate in each. Slightly less asphalt sometimes is specified for the lower courses.

Rolling Individual Courses

Obtaining high density in successive layers by proper rolling is of greatest importance. Where traffic is light or is well distributed over the entire surface, the traffic itself will produce high density during the months and years following the laying of the pavement, but this effect cannot be depended upon where traffic is heavy and largely concentrated in narrow tracks. Heavily concentrated traffic on poorly compacted material may form ruts which will be the beginning of failures.

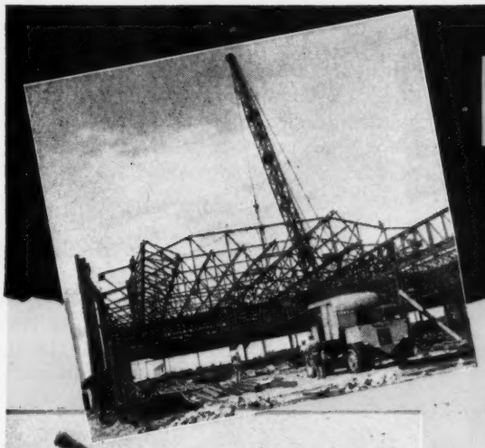
On pavements which receive heavy, concentrated traffic, the use of 12- to 15-ton rollers may be well worth while as a better guarantee against insufficient compaction. Ten-ton rollers, however, should be satisfactory, provided the rolling is done in required amount at the proper stage of cooling of a hot mix or curing of a cold mix. All bituminous mixtures respond perfectly to rolling done at the right time. High density is most important at stopping points, such as bus stops and stop streets, on heavily traveled pavements.

Maximum density and stability are obtained by rolling bituminous concrete in comparatively thin layers. One engineer reports that greatest resistance to shoving at bus stops has been obtained by

(Continued on page 158)

MOBIL-IZE FOR SPEED!

Put Your Jobs On Wheels With Lorain Rubber-Tired Shovels and Cranes



Moto-Crane erecting steel.

IN a fast moving postwar world, *speed* will be the key to greater construction profits—speed on the job—speed to cut time lost moving between jobs—and speed in converting equipment from one kind of work to another. Lorain rubber-tired shovels and cranes will help you get there fast—do it fast—and change to the next job fast!

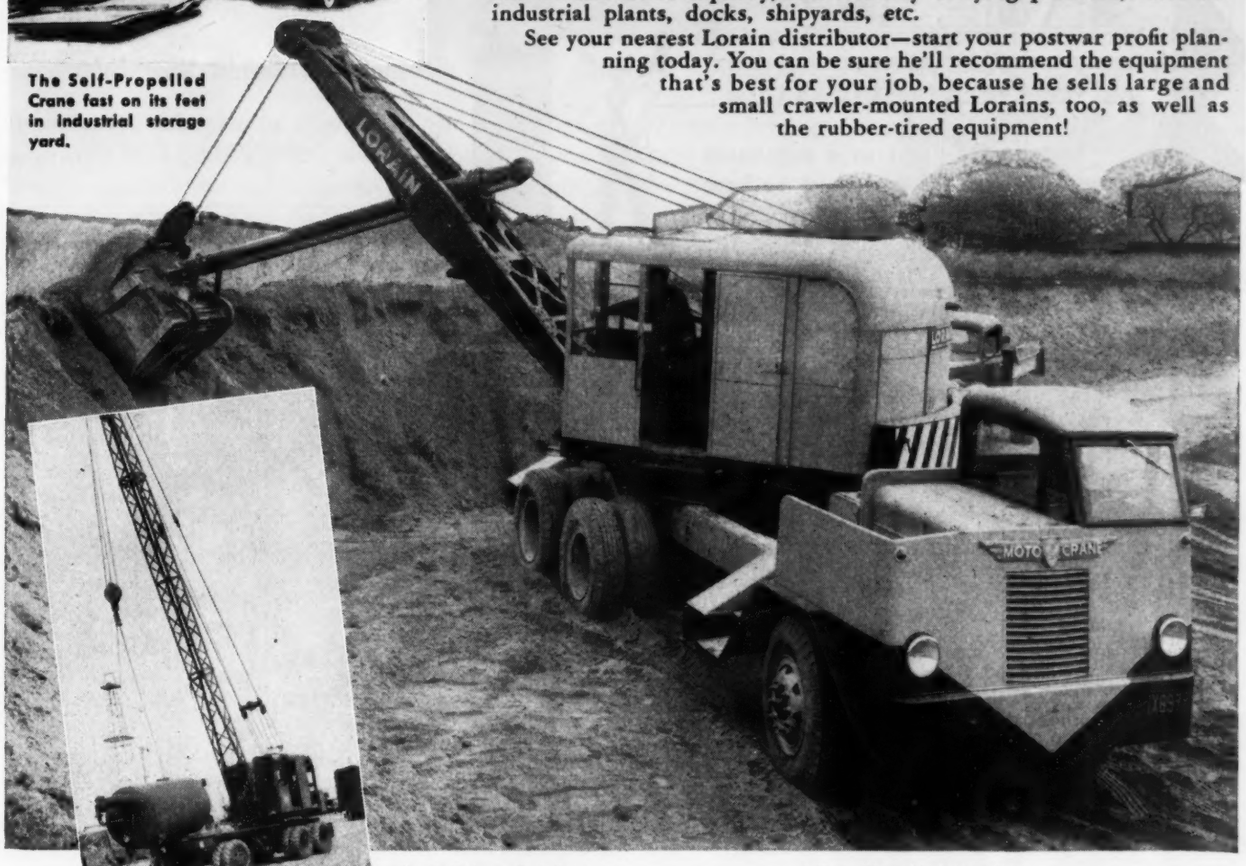
TWO TYPES OF RUBBER-TIRED MACHINES

Moto-Cranes and Shovels feature 30 MPH speed between jobs, 15 and 20 ton capacities and high on-the-job efficiency. They are available in both 4 x 6 and 6 x 6 (front-wheel drive) models.

The Lorain rubber-tired Self-Propelled Crane is operated and propelled by a single engine and single operator. This new unit has high local mobility, with speeds up to 7 MPH for quick shifts on location, and 20-ton crane capacity, and a handy carrying platform, ideal for industrial plants, docks, shipyards, etc.

See your nearest Lorain distributor—start your postwar profit planning today. You can be sure he'll recommend the equipment that's best for your job, because he sells large and small crawler-mounted Lorains, too, as well as the rubber-tired equipment!

The Self-Propelled Crane fast on its feet in industrial storage yard.



The Self-Propelled Crane transports its own load.

A Moto-Shovel is fast on the job — and between jobs.

Reg. Trade Mark

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CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

(Continued from page 156)

rolling a top course only ½ in. in depth of bituminous concrete containing ⅜-in. maximum size aggregate. For this pavement the base consisted of two 1½-in. courses of binder mix such as is used in standard binder course for sheet asphalt pavements. At critical stopping points, it is recommended that the bituminous concrete be made with selected aggregates which give high stability mixtures, as determined by a stability test.

Trench rollers or pneumatic tampers can produce good compaction in narrow strips, such as those from which street car tracks have been removed. Allowing traffic to use the binder course in places of this kind for several weeks before the final surface course is laid will help to prevent settlement and formation of ruts.

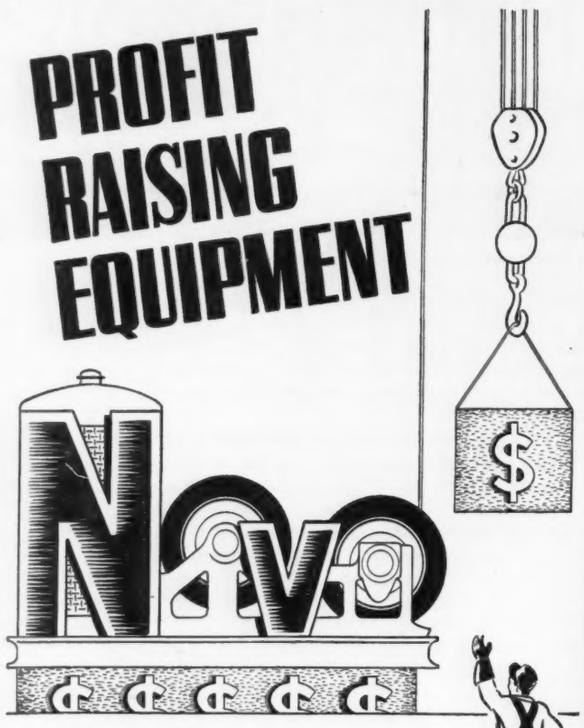
Longitudinal Joints

Joints between adjacent spreads of a course laid by paver require careful attention. On some projects these joints are not noticeable, but on others they are extremely pronounced, exhibiting a depression the full length of the pavement.

Generally a bad joint is the result of

(Continued on page 160)

PROFIT RAISING EQUIPMENT



To raise the profit on a negotiated contract . . . the cost must be kept down! One sure way to reduce cost is to replace hand labor with efficient machinery. Novo Contractors' Equipment is that sort of machinery . . . efficient, economical and dependable!

Novo's complete line of Contractors' Equipment includes Engines, Self-Priming Pumps, Diaphragm Pumps, Hoists, Generator Sets, and Pavement Breakers. They are all labor-savers . . . money-savers!

On your next construction job use "Profit Raising Equipment" . . . Novo Contractors' Equipment!

Your Novo Distributor will be happy to fully explain the Novo Line.

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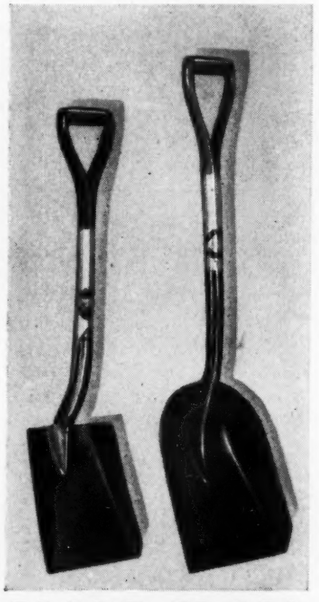

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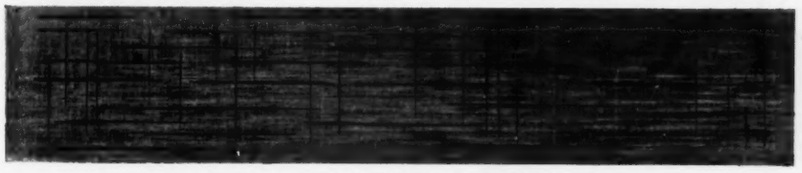
How RPM DELO Oil reduces engine wear

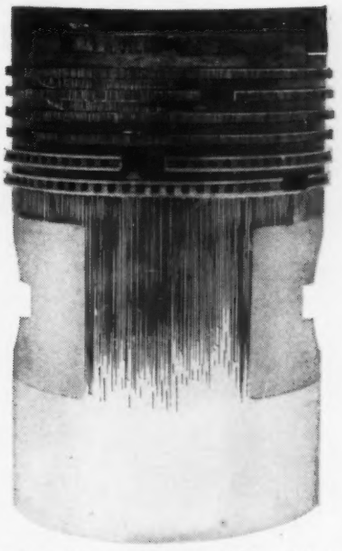
NEW PISTON RING

SCRATCHING WITH UNCOMPOUNDED MINERAL OIL

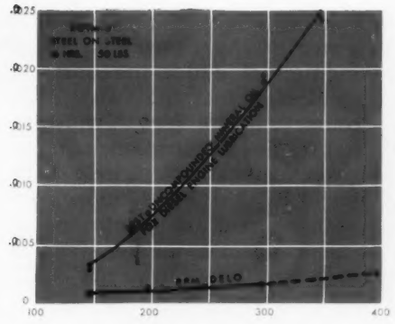


RING USED WITH RPM DELO OIL

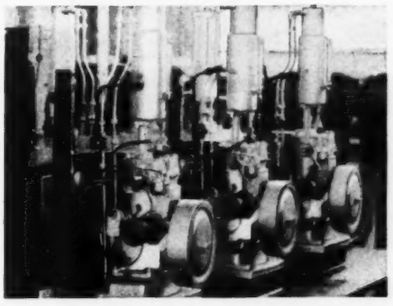
The actual photographs above, in which the lines are merely emphasized by printing in red, are typical of the results obtained when testing RPM DELO Diesel Engine Lubricating Oil against ordinary Diesel oils. Because RPM DELO Oil contains a patented metal-adhering compound, it clings to hot cylinder spots that other oils leave dry, protecting rings and liners against excessive wear.



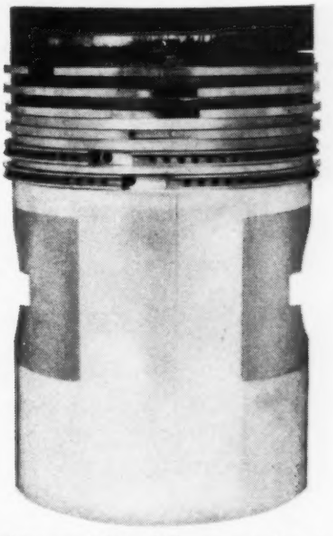
Here is a piston used in a special break-in test with straight mineral oil. This actual photo, with scratches emphasized in red, shows how rings, lands and skirt are badly scratched.



Confirming actual tests in engines are such laboratory tests as this with a Kinetic Oiliness Testing machine. RPM DELO Oil has far lower wear rate than the best uncompounded oil.



Here is a battery of special test engines in California Research Corporation's laboratories. They are used to determine the anti-ring-sticking properties of oils.



This piston went through the same test as the one above—but with RPM DELO Oil. No scratching occurred and every ring is free. RPM DELO Oil's film prevents scratching and scoring.

Detergent compound to clean engine.

Anti-oxidant to prevent gum and sludge.

Wear-reducing compound.

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RPM DELO Oil has world-wide distribution, marketed under following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, Imperial RPM DELO (CONCENTRATE)

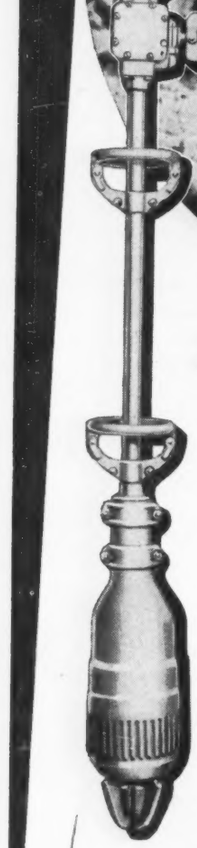
For more technical information about this revolutionary Diesel Engine lubricating oil, write to Standard of California, 225 Bush St., San Francisco 20, California, or California Commercial Co., 30 Rockefeller Plaza, New York 20, N. Y

10,000,000 *cu. yds.* of Mass Concrete Placed by JACKSON VS-4s On TVA Dams Alone

VS-4s IN USE ON GRAND COULEE DAM

JACKSON

HEAVY DUTY INTERNAL VIBRATOR



Contractors eyeing the many dam projects proposed as part of the postwar construction program can rely on JACKSON VS-4 Mass Concrete Vibrators as the outstandingly efficient machines for thorough and speedy compaction of the harsh and stiff mixes used in this type of concrete construction. JACKSON VS-4s are noted for dependability and low cost maintenance, under practically continuous operation... Big jobs where JACKSON Mass Concrete Vibrators have made outstanding records include TVA Dams, Grand Coulee, Madden, Pine Canyon (Samuel B. Morris), Conchas and Tygart Dams, to name just a few. Experienced contractors and engineers on the huge postwar hydro-electric and reclamation programs will select JACKSON VS-4s because of their performance records.

THERE IS A RIGHT JACKSON CONCRETE VIBRATOR FOR EVERY JOB

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

(Continued from page 158)

insufficient material at the junction of the two spreads. A bad joint can be prevented by the use of a small surplus of asphaltic concrete at the junction when a spread is being laid against the edge of one previously placed. The slight excess of material will concentrate the pressure of the roller wheel upon it and will thus produce a very dense mixture which will close the joint.

If the work is done in summer, such a longitudinal joint should be practically unnoticeable. In cold weather, or when considerable time intervenes between the laying of two spreads, it may be desirable to apply a thin paint coat of asphalt on the edge of the spread previously laid. For this paint coat, care should be taken not to use too much asphalt, which may be in the form of a quick-setting emulsion of the RS-1 type or a hot asphalt cement. When adjacent spreads are laid in cold weather, a properly constructed joint may be visible, but no prominence or depression will show at the time or develop later.

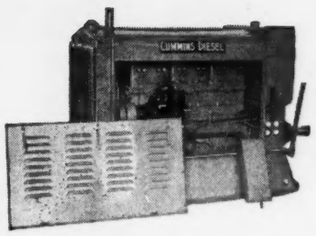
In laying successive courses, joints should be so staggered that a joint in one layer does not come directly above the joint in the layer below. This precaution is more important in cool weather than in hot. It is desirable that joints be offset not less than 6 in., although even a smaller offset is better than none at all.

On two-lane construction, longitudinal joints in the surface course should be in the center of the pavement. To offset the longitudinal joint in the course below, it is necessary that the two spreads in this course be of different widths. For joints at traffic lane divisions of multiple-lane pavements, traffic guide marks 4 in. wide of RC-3 or RC-4 cutback asphalt will both conceal the joints and maintain them against undue wear if by chance perfect joints have not been constructed.

Hot Mix vs. Cold Mix

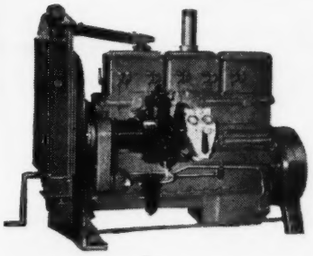
Various classes of hot mixes and cold mixes (workable when cold) are available for widening and resurfacing. Variations in hot mix types usually consist of differences in maximum size of aggregate, in grading of the aggregate, and in hardness of the asphalt, the last generally being adjusted to fit the intensity of traffic. Cold mix types not only have all the above variations but also are made with different grades of cutback and emulsified asphalts. The cold mixes must of necessity have more open grading to permit proper curing before a second layer is placed or heavy traffic is permitted on them. Cold mix

(Continued on page 162)



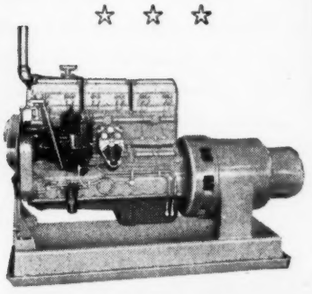
Model H Cummins Diesel is offered in both four and six-cylinder arrangements, developing maximum output of 100 and 150 hp., respectively. This engine is manufactured in a complete line of industrial and automotive models, such as the Model HP-600 power unit, shown above, and Model HBI-600, right, for wheel or track-mounted equipment.

☆ ☆ ☆



The Model HIP-600 is an open type power unit incorporating the same basic engine as that described above. It has a 4⅞" bore and 6" stroke, the six-cylinder unit having a piston displacement of 672 cu. in., and the four-cylinder, 448 cu. in.

☆ ☆ ☆



The Model HGA-601 is an AC generating set, rated 50 kw. at 1200 rpm. The four-cylinder Model H generating set is rated 30 kw. at 1200 rpm. Both four and six-cylinder sets are also available for DC operations.

"The job you want done is now being done by Cummins Dependable Diesels." That is a statement of fact . . . backed by a 12-year demonstration of reliable, low-cost performance . . . covering all types of heavy-duty equipment and power applications in the construction and aggregates industries — bar none!

CUMMINS ENGINE COMPANY, INC.
Columbus, Indiana

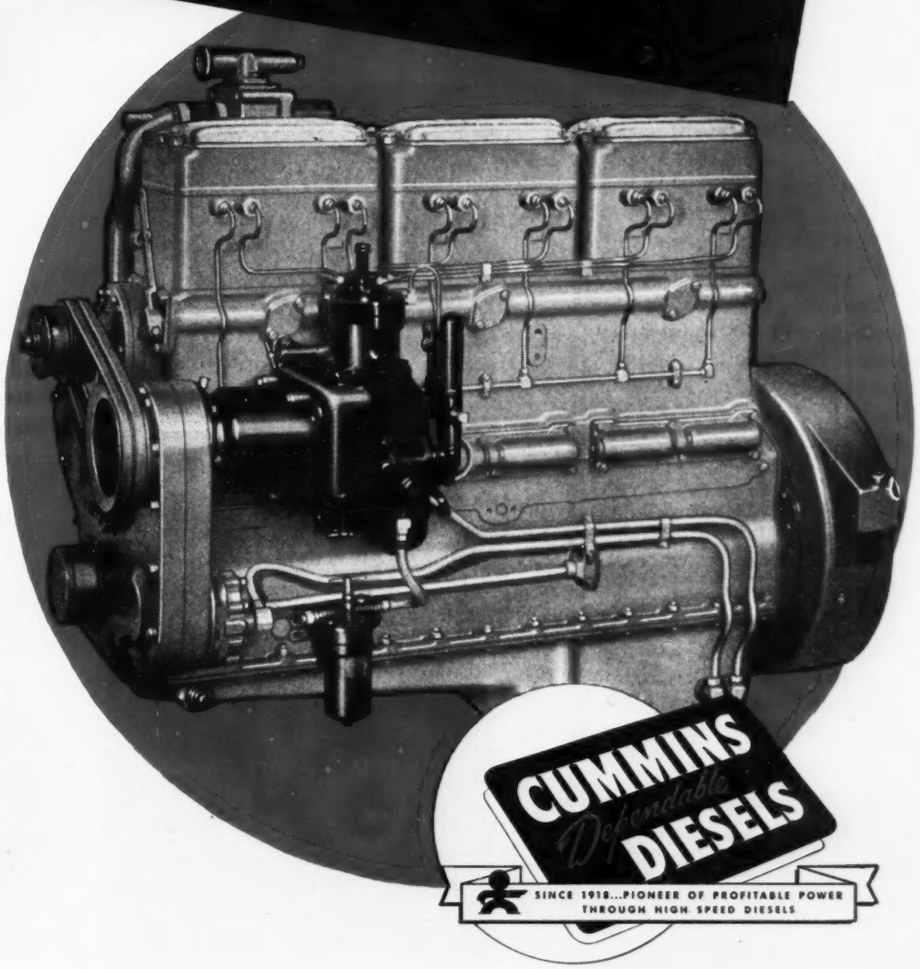
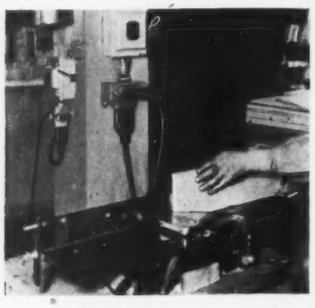


Photo shows portable and stationary application of Mines Molded Rubber Connectors.



There's a Water-Seal MOLDED RUBBER CONNECTOR Designed For Any Portable Power Supply Application

Many types and sizes of Mines Molded Rubber Connectors have been developed, making them adaptable to almost any application where power is transmitted by portable cable. Stationary receptacles are also available for each portable type.

Molded on the desired cable length for the work to be done, Mines Cable Connectors become a part of the cable itself.

The spring pressure female contacts and the water-seal assure you a safe, positive connection with the male connector for efficient power supply to any machine under all plant conditions.

Mines Water-Seal Connectors are available in single conductor and multi-conductor types.

Our engineers will gladly work with you in solving portable power transmission problems on capacities up to 5000 volts and 325 amps.

Write for Bulletin MC-106.

MINES EQUIPMENT COMPANY

4245 Clayton Avenue
St. Louis 10, Missouri

(Continued from page 160)

types made with heavy emulsions or cutbacks containing a minimum of distillates develop early stability and can be made to approach more closely the dense-graded hot mix types.

Engineers differ on the relative merits of these two types of pavements. Excellent results can be obtained with each. Hot mix frequently is selected because it can be opened to traffic soon after laying. Much resurfacing work now is done while keeping one traffic lane open. A slow-curing cold mix cannot carry traffic until sufficient stability is developed to resist displacement. The required curing period before heavy, high speed traffic can safely be permitted on a cold mix will depend upon the type of mixture, weather conditions and severity of the traffic.

Plant Mix vs. Road Mix and Penetration Type

Hot plant-mix bituminous concrete has been given the most prominent place in this discussion of resurfacing old roads. It stands at the top for use on heavily traveled pavements in areas where plant facilities are available and interference

(Continued on page 164)

Serving the Services is a HIGH HONOR

WHITE TRANSITS and LEVELS

are doing an outstanding job throughout the World

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• Send for Bulletin 1039

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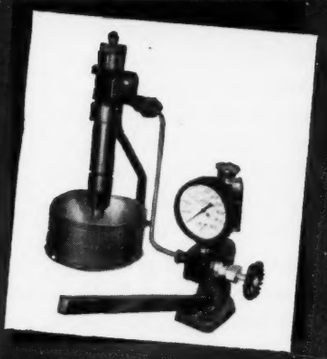

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To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy-duty service, it enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p.s.i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.

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That's the story of many of the airfields at home and abroad via which men and materials are today reaching our far-flung fighting fronts. We're proud of the war-time job the new Huber Rollers have done and are doing, and you'll be just as favorably impressed with their performance when they're again available . . . soon, we hope . . . for peacetime construction assignments.

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If you have ROW-TYPE tractors, you need an Automatic Loader on every job location. This sturdy, low cost loader does the work of 10 men! Attaches easily and quickly to most any row-type tractor. Patented *Perfection* dump control and 8-foot lift gives operator constant control. All steel construction with heavy boom. . . . Positive action. . . . Simplified operation from power take-off. . . . Has ¼-yd. bucket. . . . Fast. . . . Built to last for years! No other loader near its price offers so many advantages!

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SUPER-PERFORMANCE

Like that of the B-29, Owen superiority is based upon a thorough knowledge of the problem, expert designing and precision manufacturing from the most appropriate materials available

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OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

(Continued from page 162)

with traffic is an important factor during the work. Road-mix and penetration types usually interfere with traffic much more than does the hot plant-mix type.

Some organizations have developed a technique of resurfacing with road mix on one-half the road at a time, using a heavy grade of cutback asphalt such as MC-5. This work, practical only in warm weather, provides a surface which can be opened promptly after completion, without a curing period, where traffic is not too heavy. On secondary roads and in locations where plants are not readily available and where comparatively small quantities of material are required, road-mix or penetration types of pavement may be well justified.

Road-mix construction can produce as smooth a riding surface as can be built with plant mix laid by machine. In fact, long undulations can be more effectively corrected by means of road mix with a long-base drag or motor grader than by plant mix laid with a conventional paver. Long undulations can, of course, be eliminated as well by spreading a first course of cold workable plant mix with similar long-base machines. Some good engineering organizations fail to take advantage of this principle.

It is necessary to permit cold, workable mixes to cure sufficiently to acquire good stability before the next course is laid on them. This precaution is most necessary on heavily traveled roads to guarantee against displacement in the surface.

With the penetration type, it is more difficult to produce as smooth a riding surface, although construction crews of long experience do excellent work by the penetration method. In some places a penetration base course supports a plant-mix top. Where suitable aggregate for a penetration base is readily available, this construction may be the most economical, provided long interference with traffic is not a major objection. Ordinarily, aggregates suitable for plant mix will be more readily available than the coarser sizes required for penetration work.

Height of Curb

When constructing new pavement with raised curbs on city streets, it is desirable to make the curb high enough to allow for future resurfacing without wiping out the drainage capacity of the gutter adjacent to the curb. It is not looking too far ahead to say that two resurfacings with a total thickness of 5 in. may be necessary in a period of 50 yr. An original 9-in. curb would, after the second resurfacing, still have a height of 4 in., ordinarily ample for drainage purposes. A 9-in. curb should be sloped back 2

(Continued on page 166)

On the side, Mister . . .

BLACKHAWK JACKS HANDLE ANY JOB

BLACKHAWK Hydraulic Jacks deliver full power fast — at any angle, vertical to horizontal. That's why they're so helpful on many construction jobs.

Blackhawk Jacks can operate horizontally at floor level because the pump handle extends outward to the operator — not toward the floor. And Blackhawk's original pump-on-side design permits such horizontal operation without need for complicated internal oil channels that make action sluggish.

For fast-action jacks, in any position — buy the best — buy Blackhawks from your Blackhawk distributor. Capacities from 3 tons to 50 tons.

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Trailer Trucks (All Types) Wheel Tractor Cranes (3 to 7 ton) Fork Lift Trucks, Lift Platforms, Hoists, Live Skids, Wheels, Casters.

(Continued from page 164)

in. to prevent damage to tires and running board.

On any basis of computation, provision of a 9-in. curb in place of the conventional 6-in. height will in the end mean a great saving of money to the municipal government by permitting the street to be resurfaced instead of torn up and replaced. Perhaps no other item in paving work offers opportunity for so great a saving at so little added original cost as the construction of higher curbs to accommodate resurfacing in later years.

Trends in Design and Construction

Study of the development of good practices in widening and resurfacing pavements shows that most engineering organizations go through much the same evolution, namely: (1) from a comparatively thin to a thicker resurfacing; (2) from a cold to a hot mix; (3) from a hard to a softer asphalt; (4) from uncoated aggregate to plant-mix asphaltic concrete for base courses on narrow trench widening; (5) from dependence on rigid forms to use of the paver type of machine for laying without forms. Development of new machinery has had much to do with the evolution of methods of bituminous concrete construction. More efficient dryers and proportioning devices and the perfecting of laying and finishing machines have contributed most to the advance in construction operations. Additional improvements in equipment now being developed will still further lower the cost of this type of pavement.

★ ★ ★

Huge Concrete Warehouses

(Continued from page 93)

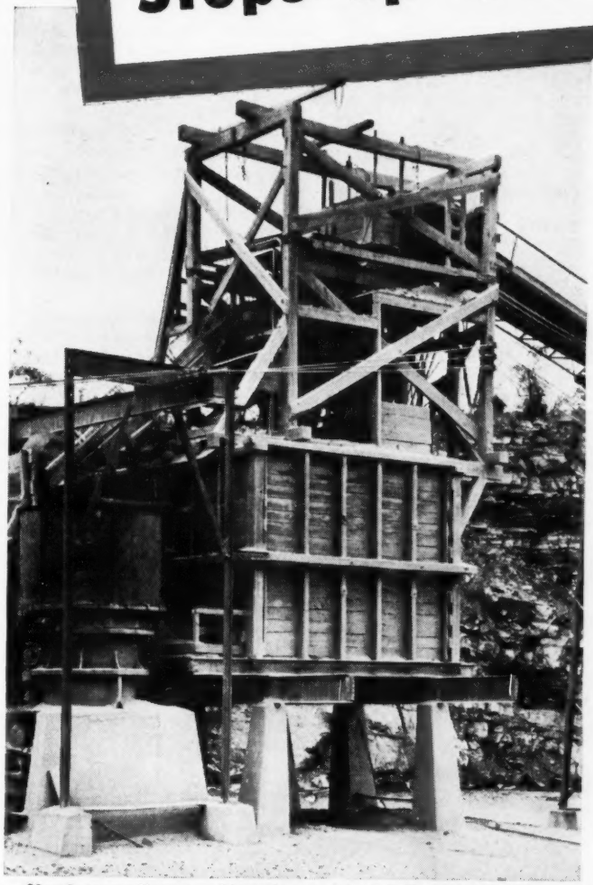
stricted to 5,000 pounds per square foot.

The largest single operation in connection with construction of the warehouses was the forming of the arch roof slabs with their edge beams. The usual pour included the full width of the building of 4 bays and 80 ft., or two bays in length.

Four sections of 80-ft. forms were used in order to permit successive placement of reinforcement steel and concrete. Forms were constructed of wood trusses

(Continued on page 168)

Modernization with TELSMITH Steps-up Quarry Plant Output



New intermediate-crushing plant, with 16-B Telsmith Gyratory Crusher and 2-deck 4' x 12' Pulsator Screen

• War plant projects, strategic road construction, airport developments, essential municipal and state highway maintenance in the Reading, Pa. area, imposed new and heavier demands on the Berks Products Corp. rock crushing plant.

To turn out 1500 tons a day *consistently* with an increasingly larger percentage of finer sizes, called for plant modernization. But wartime restrictions meant less manpower and a minimum of new equipment. Yet maximum operating efficiency was built in by using the right Telsmith equipment.

Roundabout handling and material flow bottlenecks were eliminated by relocating the primary jaw crusher down on the quarry floor and building a new conveyor-connected screening-and-intermediate-crushing plant half-way up the incline. Its 16-B Telsmith Gyratory Crusher takes the oversize from a Telsmith 4′ x 12′ 2-deck Pulsator Scalping Screen located above a 125-ft. bin for 3 sizes of product.

This relieves main plant screen from coarse scalping duty, gives far better classification, and faster, more flexible secondary crushing. And, in the main plant, the installation of a No. 48 Telsmith Gyrasphere Crusher, in closed circuit with the screens, assures top tonnage of fines in all desired sizes.

Planning future modernization, expansion, or a complete new plant? Consult Telsmith engineers. Get Bulletin E-10. Q13

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51 East 42nd St. New York 17, N. Y.	211 W. Wacker Drive Chicago 6, Ill.	713 Commercial Trust Bldg. Philadelphia 2, Pa.	247 Third Street Cambridge 42, Mass.	Boehck Eqpt. Co. Milwaukee 3, Wis.	Mines Eng. & Eqpt. Co. San Francisco 4—Los Angeles 14
Brandeis M. & S. Co. Louisville 8, Ky.	Rish Equipment Co. Charleston 22, & Clarksburg, W. Va.	Rish Equipment Co. Roanoke 7, & Richmond 10, Va.	North Carolina Eqpt. Co. Raleigh and Charlotte 1, N.C.		Wilson-Weesner-Wilkinson Co. Knoxville 8, & Nashville 6, Tenn.

(Continued from page 166)

with plywood covering. Supports for the forms were provided with wheels which rested on steel rails, and provisions were made for raising and lowering the forms by jacks so that each 80-ft. section could be moved along without dismantling.

The administration building is E-shaped in plan with its main portion 272 ft. long and 41 ft., 2 in. wide. The two wings are 127 ft. long and 40 ft., 4 in. wide. The central wing of the same width is 91 ft. long. Wings are separated from the main building by fire walls.

Eight-inch concrete masonry walls and 4-in. concrete slab floors form the cafeteria, 40 ft.x174 ft., 8 in., and other accessory structures.

The fire station 84 ft.x48 ft., 8 in. was built of 8 in. concrete block and provided with a 5 in. concrete floor. The motor maintenance shop 65 ft.x113 ft., 2 in. was provided with 12-in. concrete masonry walls and a 5-in. concrete floor.

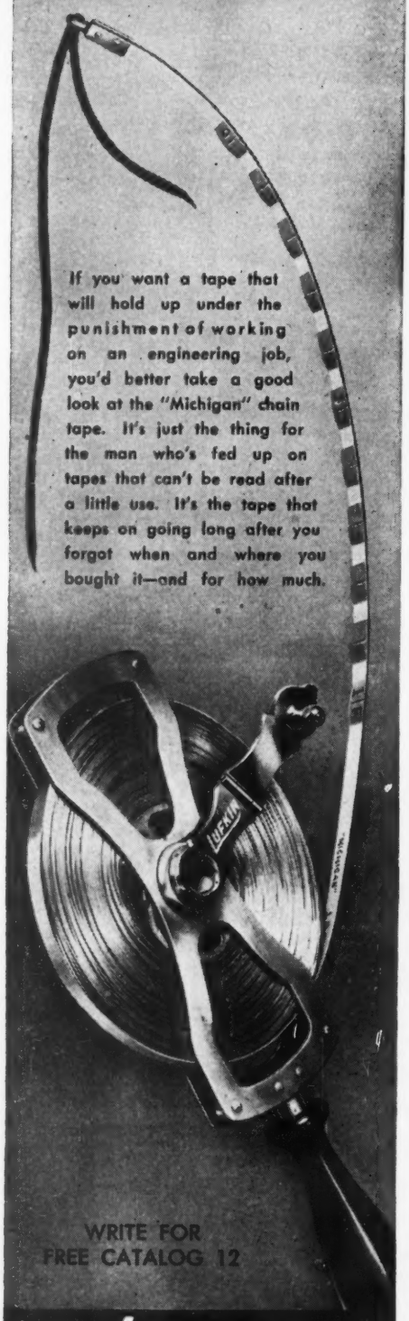
The boiler house is a high concrete framed structure with concrete coal bunkers in the upper portion, providing continuous gravity feed for the boilers.

The entire drainage system for the depot is made of concrete pipe, of dimen-

(Continued on page 170)

LUFKIN

"MICHIGAN" BABBITT TAPES



If you want a tape that will hold up under the punishment of working on an engineering job, you'd better take a good look at the "Michigan" chain tape. It's just the thing for the man who's fed up on tapes that can't be read after a little use. It's the tape that keeps on going long after you forgot when and where you bought it—and for how much.

WRITE FOR FREE CATALOG 12

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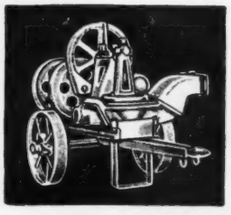
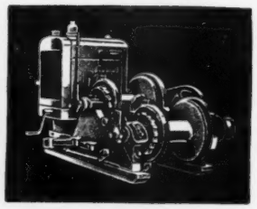


Also 3-Ton Road Roller

HOISTS

5 sizes — from 800# to 7000# lifting capacity — gasoline engine or motor drive.



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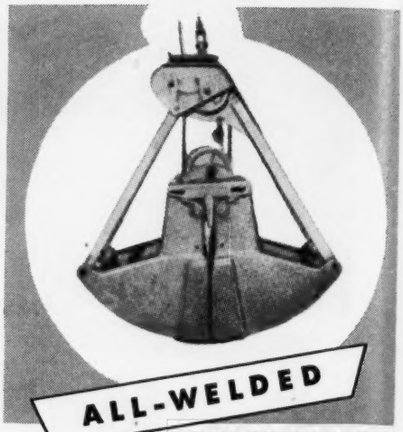
JOHNSON



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FAST, LOW-COST DIGGING

Hard, on-the-job experience proves the many practical advantages of Johnson Clamshell Buckets — they dig cleaner and faster and last longer. Renewable lip edge-bar of tough manganese steel reduces wear and is readily replaced in the field.

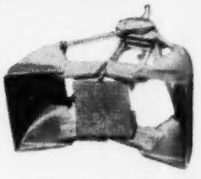
Absence of power-wasting rivets and bolts streamlines digging action. The shell is shaped to fill quickly and easily with a minimum of lifting action. The result is better balance and improved digging quality in all types of material.

Needle-bearing mounted closing sheaves, sealed against dirt and moisture, give free-running cable action at all times.

Cable wear is greatly reduced by guide sheaves which replace ordinary crossrollers. Lower sheaves are protected by extra heavy steel plates.

General purpose type ½ to 2 yard capacity in stock for immediate delivery to contractors with required government authorization.

Johnson Clamshell Bucket showing manganese steel teeth designed for smooth, speedy digging.



Johnson Bucket in open position showing heavy shock-preventing protection plate for lower sheave assembly.

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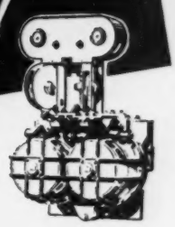
. . . that makes the man

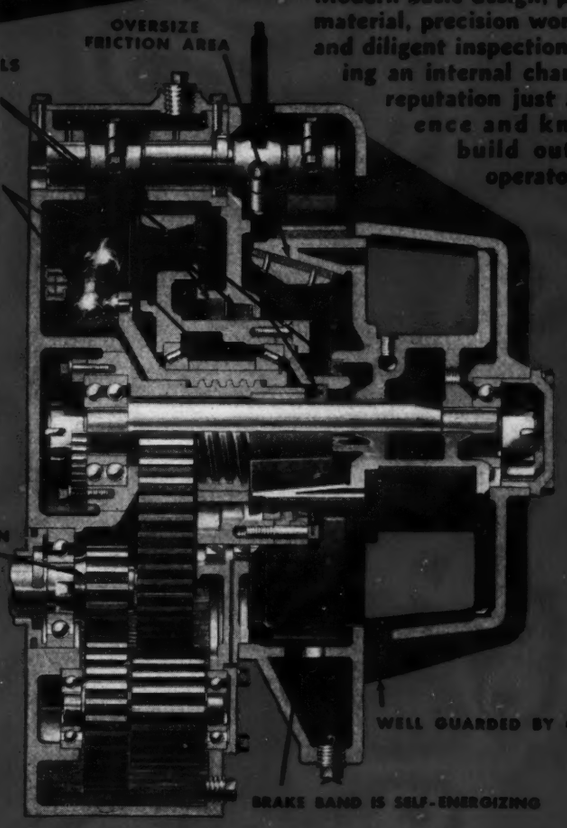
Isaacson KABLE POWER UNIT

. . . is like that, too!



The same internal character is built into either the single or double drum units—both are available for your tractor.

Modern basic design, plus tested material, precision workmanship and diligent inspection, is building an internal character and reputation just as experience and knowledge build outstanding operators.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(Continued from page 168)

sions varying from 10 to 48 in. in diameter.

The architect-engineer for the warehouses was the Roberts & Schaefer Company of Chicago, and architect-engineer for the 25 utility buildings and site improvements, including utilities, was Mills, Rhines, Bellman, Nordhoff, of Toledo, Ohio, now practicing under name of Bellman, Gillett & Richards.

Contractors were: for grading, utilities and roads W. L. Johnson, of Hicksville, Ohio; warehouses, Corbetta Construction Co., New York City; and utilities buildings, Ferro Concrete Construction Co., Cincinnati, Ohio.

All work was done under direct supervision of the Wright Field district office of the U. S. Engineers.

★ ★ ★

Brick Runway

(Continued from page 79)

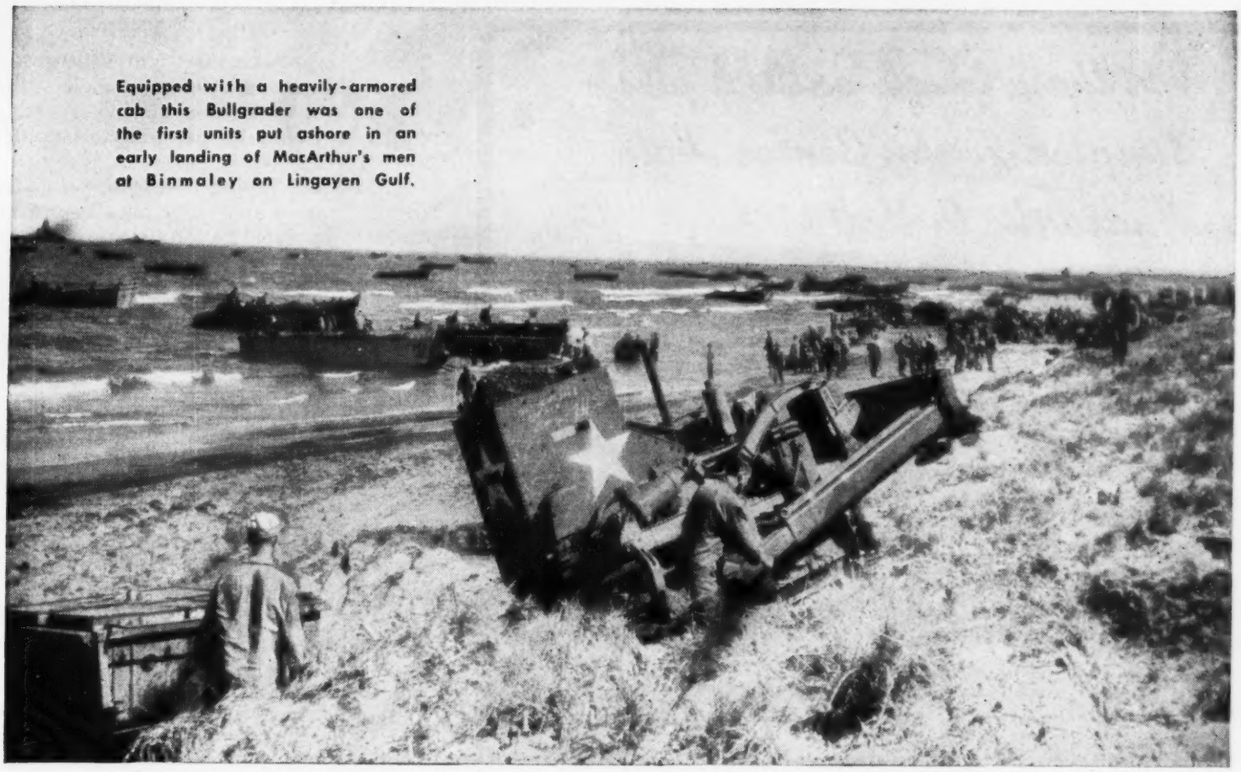
took several weeks to complete the task and during that time hundreds of tons of marshy soil were removed. As a result, the water level dropped to the desired point and the ground, no longer saturated with water, became firm enough to provide a suitable place for mechanical equipment to operate.

At this stage it was possible to start levelling and grading of the earth surface by means of some 20 bulldozers, scrapers and auto-patrols. The auto-patrol, a power-driven machine, gives a fine finished grading to the soil already loosened and scraped, thus preparing it for the subsequent brick-laying.

12,000,000 Brick Needed

The problem of insuring adequate brick supplies was a formidable one. More than 12,000,000 brick were required for the single runway, 4,500 ft. long and 120 ft. wide, together with the airfield perimeter and taxi tracks. Not only was the local supply of brick insufficient to meet this demand, but those available were not even baked. Five Dutch brickworks were, therefore, placed in operation after years of idleness during the German occupation, and were supplied with the necessary coal for the kilns. A schedule of collection was worked out and adequate transport provided for speedy delivery. Immediate transportation of the brick to the air-

(Continued on page 172)



Equipped with a heavily-armored cab this Bullgrader was one of the first units put ashore in an early landing of MacArthur's men at Binmaley on Lingayen Gulf.

SHORTENING THE ROAD TO TOKYO

Guadalcanal . . . New Guinea . . . Saipan . . . Luzon . . . Iwo . . . each advance in the relentless drive on Japan brings new, "impossible" jobs to do — roads to cut through jungle, airports to build with coral, by-products of battle to clear, unforeseen emergencies to meet.

Versatile earthmovers, like the Bucyrus-Erie Bullgrader above, take the "impossible" in stride. Established in peacetime and confirmed in battle, their dirt-moving efficiency puts them in the van of every invasion. The call for them continues, undiminished, to help speed work on the biggest contract in the world — shortening the road to Tokyo!

2T45

While a large share of our production is still going to the armed forces, a limited number of Bullgraders, Bulldozers, Scrapers and Dozer-shovels are available for civilian use. See your International TracTracTor Distributor for information on new Bucyrus-Erie Tractor Equipment and for rentals and service. Let him help you modernize your equipment at Victory.

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BUCYRUS ERIE TRACTOR EQUIPMENT

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For those tough pulling jobs — Simplex Jenny Center Hole Hydraulic Puller!

Five models; capacities 30 to 100-tons.

Completes in minutes—production, maintenance and repair jobs which otherwise require hours. Pulls, pushes or lifts and can readily be set up as a portable press. Center hole makes unit a great saver of manpower when pulling bushings, cylinder liners, pistons, wrist pins, valve seats, keys, wheels, sprockets, gears, boiler tubes, pipes, etc. Built of heat treated alloy steels. Ask for Bulletin No. 43J.

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Write for bulletin on the proper care and lubrication of jacks.

Reliance *NOW*

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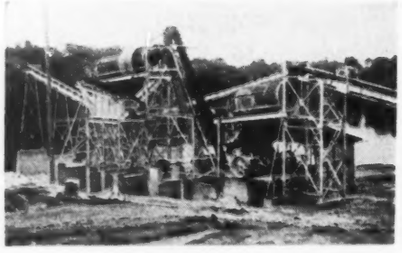

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(Continued from page 170)

field site was necessary, while the ground was still being levelled, and their supply became the criterion of the speed at which it would be possible to complete the job.

The actual laying of the brick caused administrative and labor problems. Some hundreds of local Dutch bricklayers were employed for the construction of the runway, but no individual could be signed on and set to work until his background and credentials were thoroughly checked and approved by Civil Affairs with the aid of the Security Section of the R.A.F. Police. Simultaneously, the ration problem also had to be solved. Existing food rations issued to civilians undertaking a full day's manual work were stepped up. Each worker had a hot mid-day meal on the spot. On the whole, the Dutch laborers proved both willing and capable. Most of them had considerable prewar bricklaying experience acquired during the laying and maintenance of brick roads in Holland.

The subgrade at this particular airfield consists of fine sand and clay, and it was not until this rather tricky mixture had been graded out to line and level, thus providing a satisfactory foundation for the runway's surface, that the bricklaying actually commenced. Between 12 and 20 men spread out across the 120-ft. width of the runway, setting the bricks in place with sand and trowels. Work on several sections of the runway was in progress at the same time, until eventually the sections were connected to form a continuous surface. This was topped off with additional sand so that, as the runway "weathered," the sand worked down into the joints between the bricks and packed tightly.

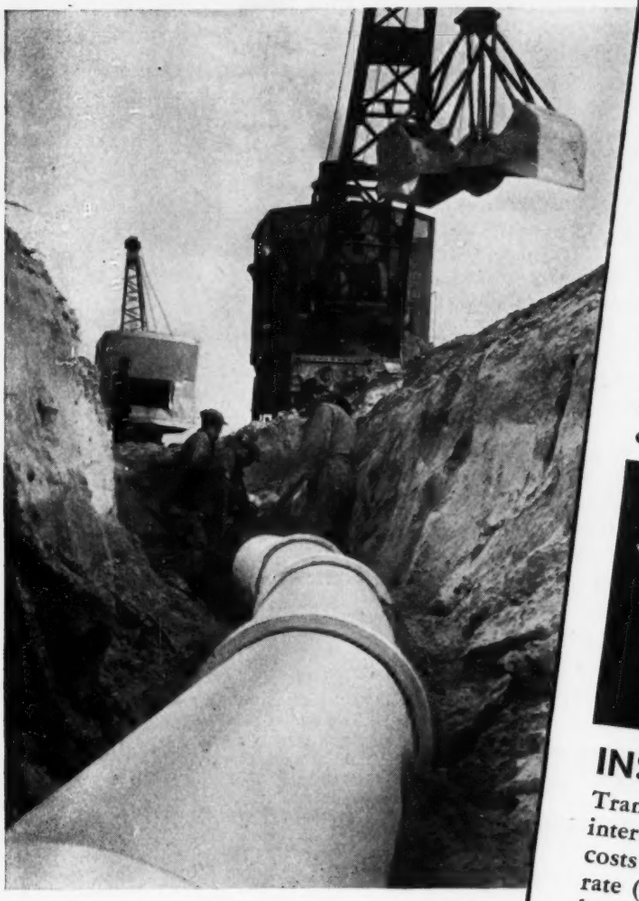
The runway was then given a final heavy tamping, section by section, using weighty wooden blocks 3 ft. long and 12 in. square. By this means, much of the excess sand was forced down between the bricks to give maximum surface consolidation.

Other Difficulties Encountered

But difficulties were yet to be encountered. While the construction of the runway proceeded, the worst floods in years produced soft spots in the surface formation owing to the excessive clay content of the soil. Re-excavation was necessary and the depressions had to be filled with broken brick before the runway surface could be durably relaid. The drainage system, too, had to be extended. During December and January a frost set in which penetrated the ground to a depth of 18 in. Not only was construction work impeded but the frost-bitten ground had to be cut out with pneumatic drills and

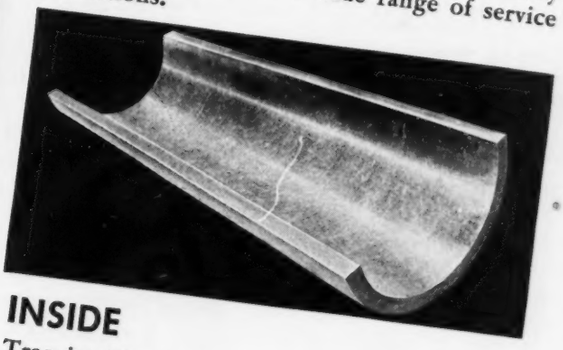
(Continued on page 174)

IT *RESISTS* CORROSION



OUTSIDE

Transite Pipe is stubbornly resistant to soil corrosion. Thousands of successful installations, many of them in highly corrosive soils, testify to its stability under a wide range of service conditions.



INSIDE

Transite Pipe cannot tuberculate. This costly internal corrosion that increases maintenance costs can never choke off its initial high flow rate (C=140). As a result, pumping costs stay low, pressures high.

AND ALL THE WAY THROUGH

Transite Pipe resists destructive attack. Made of asbestos and cement bonded together under great pressure, its ability to provide efficient, economical water transportation has been proved in thousands of installations.

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is another advantage of Transite Pipe. Its light weight means more footage carried per truck load, fewer men required for handling, lower transportation costs. And in the trench, the Simplex Coupling assures quick, easy assembly, even with inexperienced crews.

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JOHNS MANVILLE JM PRODUCTS

Johns-Manville ***TRANSITE PIPE***

FOR EFFICIENT, ECONOMICAL WATER TRANSPORTATION

(Continued from page 172)

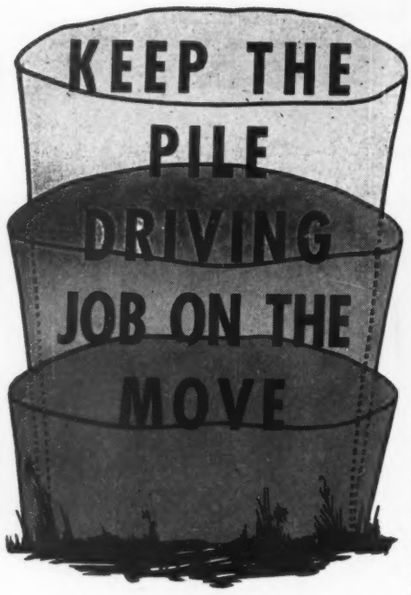
replaced with broken brick hard-core and pure sand before bricklaying could be resumed.

The airfield was completed under hard-frost conditions. Snow and ice covered the ground and it was difficult to judge, at the time, to what degree the firmness of the soil was attributable to successful drainage. During the slow thaw before the runway came into operational use, every part of it was watched with particular care. Large maintenance parties stood by, ready to check any signs of subsidence, but only minor "rutting" was detected. Despite every technical and physical obstacle, the whole of the gigantic enterprise was completed in 9 weeks. The delay incurred before the airfield came into operational use by R.A.F. aircraft was slight, and the surface of the runway is now as permanent and weatherproof as that of any Dutch road.

Pierced Steel Plank Runways

Airfields with pierced steel plank runways require almost the same amount of drainage preparation and soil grading, but have the virtue of greater speed in construction. For an airfield of average

(Continued on page 176)



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18C, 30C, 50C and 80C

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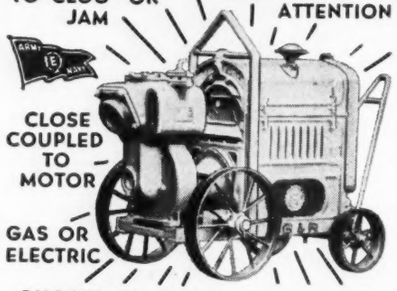

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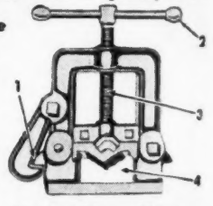

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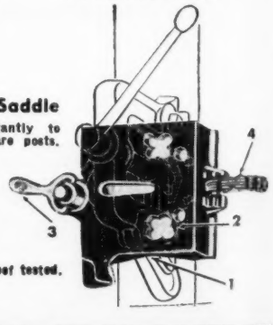

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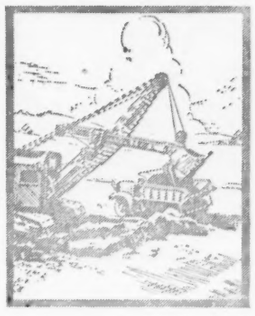

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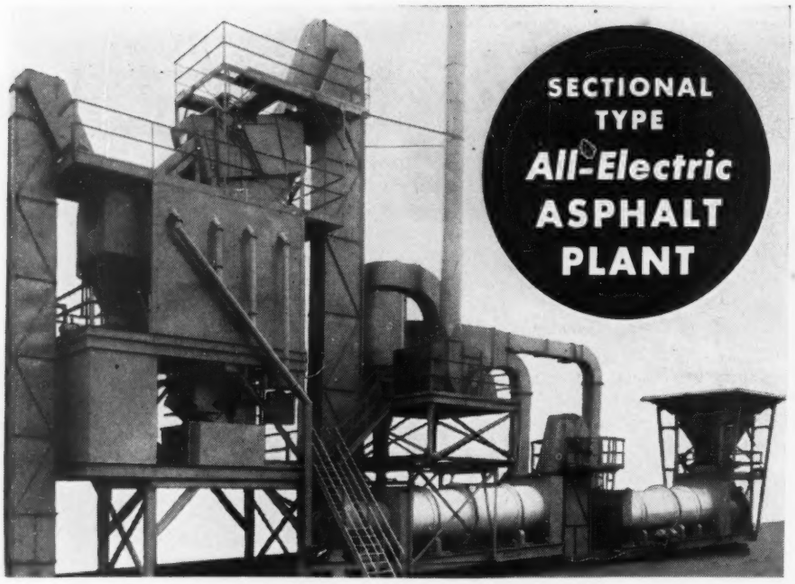

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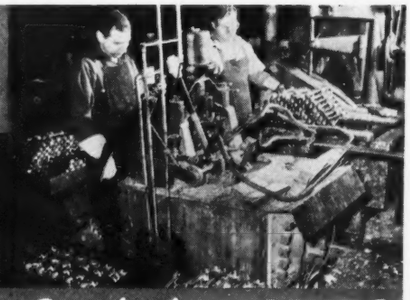

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Wisconsin Engine connecting rod bearings are babbitted in our own plant, under our own complete control. A careful check is maintained to make sure that the metal is always what it *should* be and that it is applied *the way it should be*. This helps to make a better engine . . . designed to give better service on your equipment.

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World's Largest Builders of Heavy-Duty Air-Cooled Engines

(Continued from page 174)

length runway, some 5,000 tons of pierced steel planking are required. These are thin metal sheets, 10 ft. long by 15 in. wide, slightly ribbed and pierced by rows of holes, each about 3 in. in diameter. The holes serve a dual purpose. They not only lighten the steel plank, but provide an adequate means of draining water from the runway's surface on sandy soils. A given area of P.S.P. runway is about six times lighter than the equivalent brick surface and can, of course, be laid more easily.

Airfields of this type need not be so centrally sited in relation to local resources. The runway surface is supplied by the British Army and transported to the site in trucks and since it is so much lighter than brick, the strain in available road transport is correspondingly lessened. Rutting trouble, local depression due to the poor quality of the subgrade or foundation, is also reduced.

P.S.P. vs. Brick Runways

It would seem, therefore, that airfields with P.S.P. runways enjoy all the advantages of brick-built ones without any of the drawbacks, but this is not entirely true. Actual comparison is, at the moment, undesirable for two reasons. In the first place, metal track surfaces, while suitable on certain kinds of soil, would be unsatisfactory on those less porous. The holes, in such instances, instead of assisting drainage, would tend to throw up water on to the runway surface. Secondly, brick runways are a relatively new experiment in R.A.F. airfield construction. P.S.P. is best considered in the light of semi-permanent requirements, although its use has been more extensively tested. The number of P.S.P. runways it is possible to build, however, is directly governed by the available Army stocks and the problem of transporting 5,000 tons of steel planking along congested traffic routes, often over long distances.

R.A.F. and Army airfield construction engineers were trained in the laying and use of P.S.P. long before D-Day, and both the supervision and building have been practiced to a point where they can be carried out almost with the precision of a drill movement.

Captured Fields Reconditioned

The rehabilitation of badly damaged airfields captured from the enemy, while no less important, presents an entirely different set of problems. Much of the repair assessment is done beforehand

(Continued on page 178)

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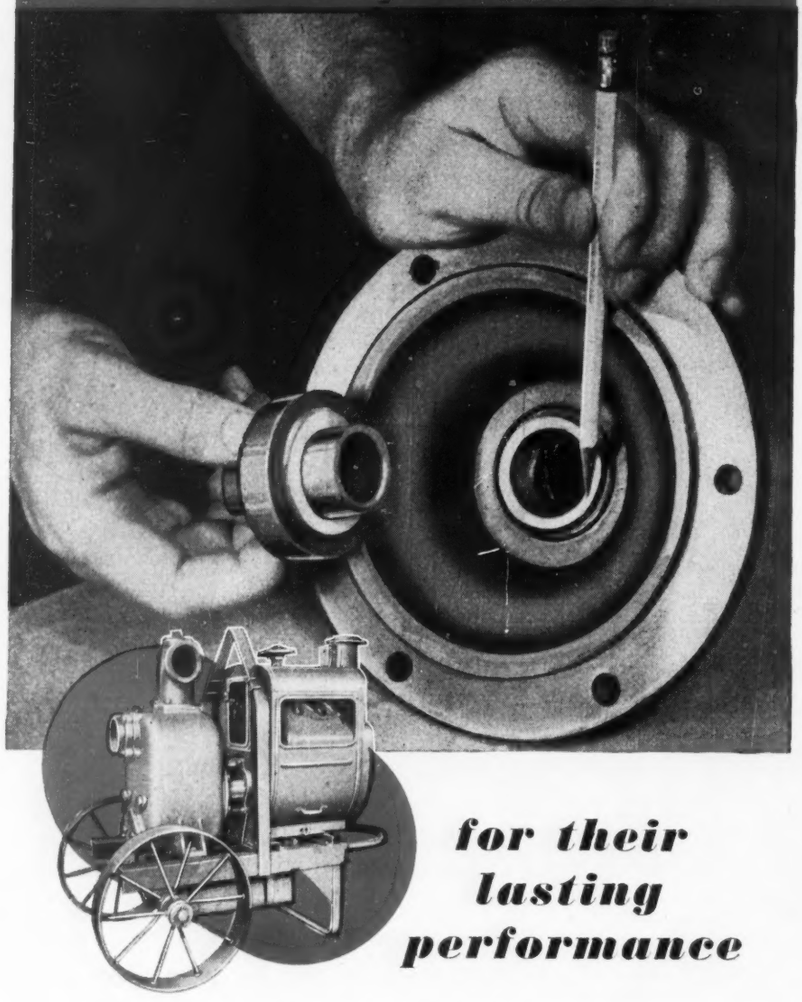

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THE CARVER PUMP CO., Muscatine, Iowa

CARVER CENTRIFUGAL Certified PUMPS

(Continued from page 176)

from the interpretation and study of aerial reconnaissance photographs. In a country like Holland, where the chief obstacle to airfield construction is the soggy nature of the ground, the Germans naturally give highest priority to drainage demolition. Grass surfaces providing the alternative to the permanent runways are often ploughed and mined. The runways themselves have, in most cases, received from Allied bombers particularly damaging attention. So accurate and destructive is their bombing that the retreating enemy scarcely ever needs to blow up a runway surface. The R.A.F. and U.S.A.A.F. have already done it for him.

Bomber Luftwaffe airfields, when viewed from an aircraft or by photo reconnaissance, are so pitted and scarred with craters that they resemble the surface of the moon. Photographic interpretation, however, reveals much more. It is possible to determine readily which runway will most easily and quickly adapt itself to repair, the number of hangars and ancillary buildings destroyed by the Germans, the probable location of mines or of local stocks of building material such as brick.

Foreknowledge acquired from photographic and other sources makes it possible to determine the priority of work to be carried out. Provision is then made and plans are drawn up which save considerable time when actual rehabilitation begins. Even so, the amount of administrative and organizing work entailed both before and during the reconstruction is almost invariably as great as that demanded by a new airfield.

Recommissioning Captured Airfields

In summer if, for tactical or other considerations, the R.A.F. is likely to require use of a captured German airfield soon after it is taken over, the first job tackled is that of making the grass strips serviceable. As far as possible and because prevailing wind conditions are important, the area parallel with the runway is first put back into commission.

The taxi tracks and perimeter also receive attention and, if the airfield is waterlogged, immediate drainage is carried out by pumping. With an eye on the time factor, work is carried on in several places simultaneously wherever this is practicable. Bomb craters, however, present a much bigger problem than would at first appear, especially where runways are concerned. The average crater throws up around its perimeter something like 300 tons of soil and rubble. The mere shovelling of this earth back into the hole is not enough. All the loose

(Continued on page 180)

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(Continued from page 178)

material in the crater needs first to be cut away and the sides trimmed. The ground must be bone dry and, where a runway is being recommissioned, the filling of craters is carried out in layers. Only then can the final resurfacing be undertaken with concrete, brick or tarmac, according to the type of surface.

It is obviously unnecessary to fill in every bomb crater in order to restore the serviceability of an airfield, but within a reasonably wide margin all craters on both sides of the runways also require immediate attention. This is to guard against the possibility of taxiing accidents, or of an aircraft not landing squarely.

★ ★ ★

Prefabricated Timber Bridge

(Continued from page 73)

a 6-in. centrifugal pump to permit excavation by a power shovel to solid bottom. Cribs are 12 ft. wide for the piers and 8 ft. wide at the abutments. Each pier crib is built up of three lines of logs in an up-and-downstream direction, with transverse logs at about 5-ft. centers.

Erecting Superstructure

Erection started at one abutment and proceeded in sequence for successive spans across the river. With the aid of a raft, workmen set two-pile falsework bents on hard bottom to support the floor beams of the span being erected. Six bents were required for each end span, and eight bents for the center span. In each bent, the pile heads were located roughly in line with the bridge trusses. Piles were cut off and capped at a proper height to permit jacking the bottom chords to exact grade.

Handling all timbers with the hand derrick, the erection crew first placed bottom chords, lateral bracing and stringers, panel by panel, for the full length of the span and then moved the derrick ahead over this floor system to complete erection of the trusses and top laterals.

Because of a shortage of manpower, construction of the project, particularly of the approaches, has taken longer than the 75 days allowed. The approaches call

(Continued on page 182)

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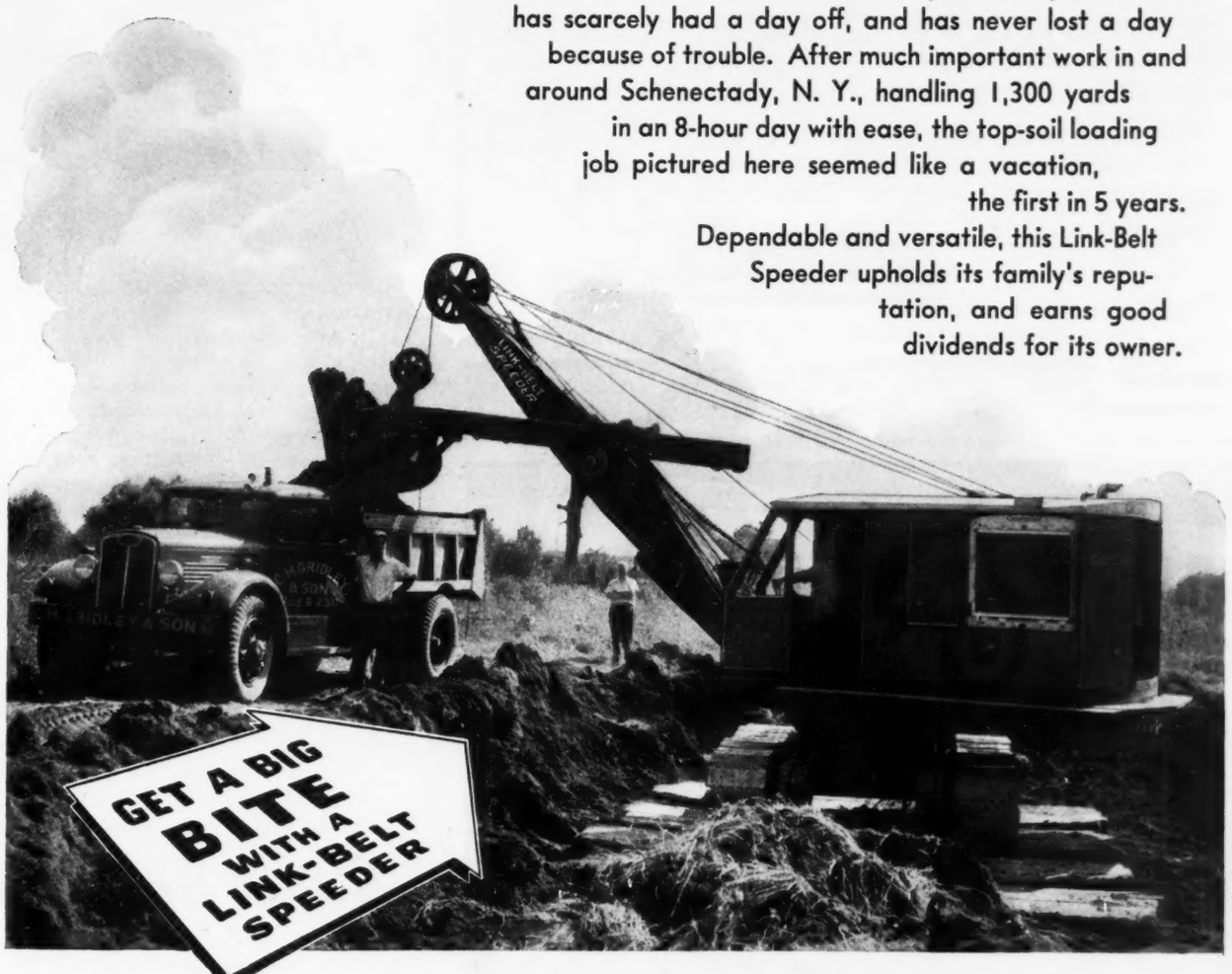
"She's Smooth, Fast, Easy to Handle!"

. . . "and she's got lots of guts!" Purchased in 1940, this Link-Belt Speeder 1-yard shovel has scarcely had a day off, and has never lost a day because of trouble. After much important work in and around Schenectady, N. Y., handling 1,300 yards in an 8-hour day with ease, the top-soil loading job pictured here seemed like a vacation, the first in 5 years. Dependable and versatile, this Link-Belt Speeder upholds its family's reputation, and earns good dividends for its owner.



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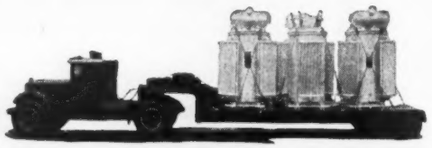

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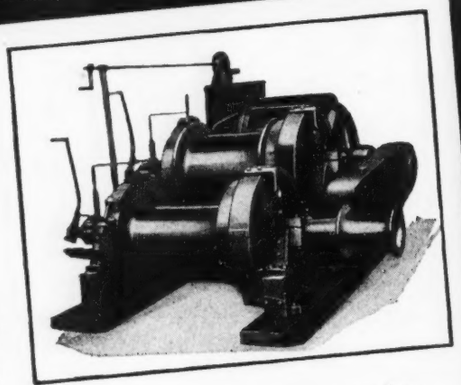

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(Continued from page 180)

for 10,000 cu.yd. of fill, 1,400 cu.yd. of riprap and 1,000 cu.yd. of gravel base for the roadway. Remaining work on the approaches will be completed this spring.

For the Maine State Highway Commission, Lucius D. Barrows is chief engineer. The bridge project is under the immediate direction of G. Lewis Johnson, resident engineer. As already noted, Walter V. Mitton, Inc., Augusta, Me., is the contractor.

★ ★ ★

All-Aluminum Floating Bridge

(Continued from page 61)

accompany each bridge set to aid in assemblies.

The new bridge will be used primarily in the attack, as follow-up to the assault-boat crossing. It will be quickly replaced by a more permanent span, then moved up again. It is so simple in design that a 301-ft. section was set up in 2 hr. 12 min. in the first service test and 45 min. have since been knocked off that time.

The deck is 12 ft. 6 in. wide between curbs, nearly 2 ft. wider than present military bridges. Designed to carry a 50-ton vehicular load in a current as swift as 10 ft. per sec., it can carry greater loads in slower currents.

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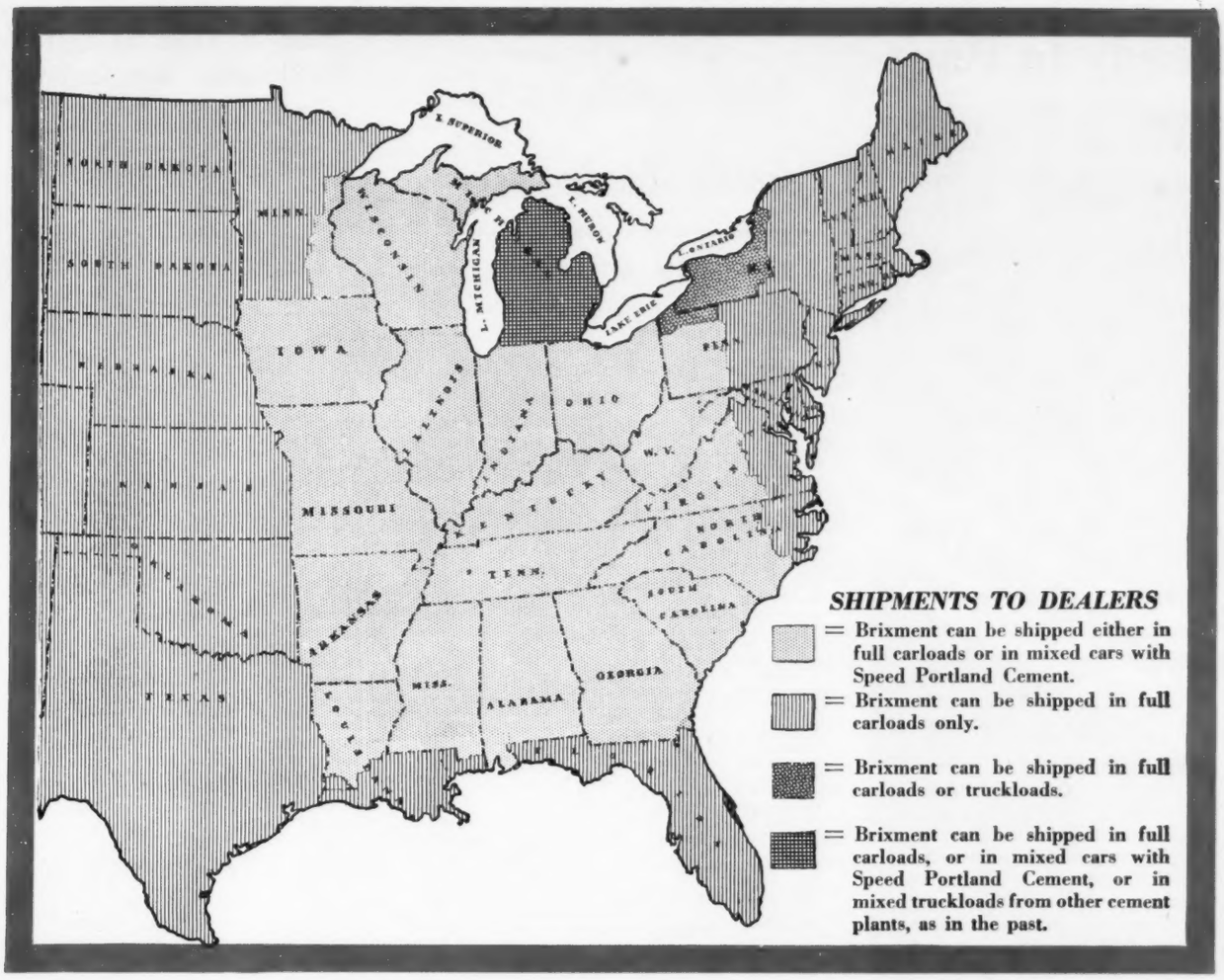
Straw Spreader

(Continued from page 93)

hedge rows spaced about 8 in. apart.

To assure proper cooling of the Ford engine, the radiator from a Caterpillar tractor engine was substituted for the smaller Ford radiator. Transmission of the Ford engine assembly was left in place and is used to obtain varying speeds in operation. The several drives throughout the machine are made from standard chains and sprockets. Structural channels and angles are used to support steel plate and most of the assembly work was done with a gas torch.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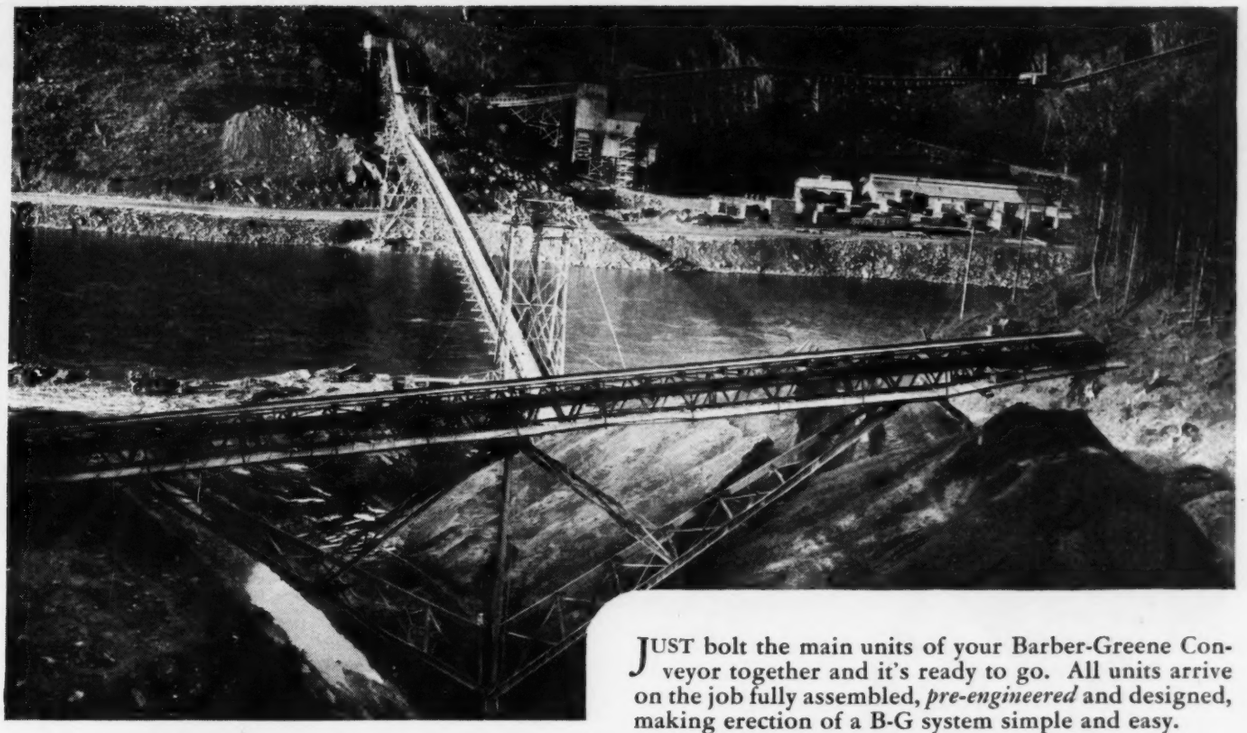

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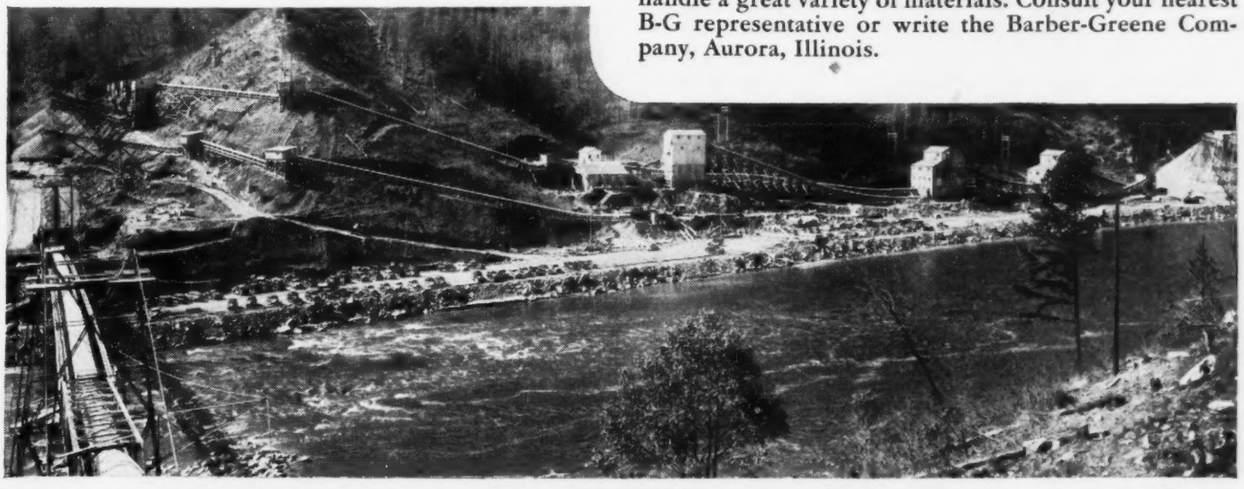

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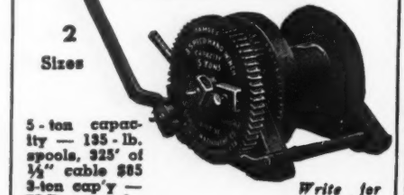

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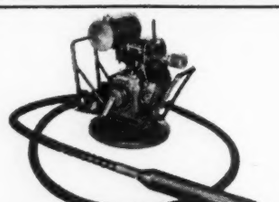

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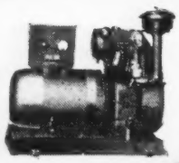

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